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East Europe Report

SCIENCE AND TECHNOLOGY

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EAST EUROPE REPORT

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ACHIEVEMENTS, PROSPECTS IN CHEMICAL SCIENCES

Tirana BULETIN I SHKENCAVE TE NATYRES in Albanian No 4, Oct-Dec 84 pp 9-14

[Article by Muharrem Frasheri, Semiramis Alia: "The Development of Chemical Sciences During the 40 Years Since the Liberation of the Fatherland"]

[Text] Our people are awaiting the celebration of the 40th anniversary of the liberation of the fatherland with great victories in all areas of the life of the country: political, social, economic, cultural, scientific, etc.

These magnificent victories, which have been achieved during these four decades, are closely connected with the correct Marxist-Leninist line which our party has followed, the party founded and directed with so much intelligence by the distinguished leader, beloved by our people, Comrade Enver Hoxha.

Among the brilliant results achieved during 40 years of socialism in our country in the fields of education, culture and science, an important place is occupied by the development of chemical sciences

Our party has always appreciated the great role of science in the building of socialism and has devoted particular attention to its development. Since the first years after liberation, when backwardness and poverty, an inheritance left from the past, from the oppressive and exploitative regimes, were still very pronounced and when the damage caused by the war and the occupiers are still tangible, the party took important measures to develop education and science, included in which were also measures to increase and develop chemical sciences.

As is well known, almost nothing was inherited from the pre-liberation period in many other branches of science as well as in chemical science, so that everything had to be begun from the beginning for their development.

When we speak of the chemical sciences and balance the achievements in this field up to now, we cannot separate and not recall the major events in their development.

In executing the directives of the party, the development of chemical sciences in our country has advanced in accordance with the requirements of our socialist economy and culture.

Above all, the development of chemical sciences in our country is closely connected with the development of education in general and of higher education in particular.

In order to respond to the requirements of plans for economic and cultural development, as well as to projects for the future development of our socialist society, immediately after liberation, the party devoted special attention to the training of cadres in various specialties, among which chemistry also figured. Parallel with sending several hundred students abroad to complete their higher studies, the party, guided by the principle of self-reliance, also took measures to create higher education within the country. Thus, two years after liberation, in 1946, the first school of higher education in our country was established: the two-year Higher Institute of Education with several branches. One of these was the branch of biology and chemistry, where chemistry and biology teachers for 7-year schools were trained. Later, within a brief period (1951-1954), 5 other institutions of higher education were established, one of which was the 4-year Higher Institute of Education. In the biology and chemistry branch of this Institute, chemistry and biology teachers for secondary schools were trained. Along with ensuring the training within the country of higher cadres in chemistry for secondary and 7-year education, the creation of these institutions also brought important development to the chemical sciences themselves raising the number of chemical disciplines developed in the schools of higher education, increasing the amount of knowledge and raising its level.

Another important step forward in the further development of higher education and science was made with the creation, in 1957, of the University of Tirana. With the establishment of the university, a series of organizational and scientific measures were taken which led to still further development of the chemical sciences. Thus, it is possible to mention the establishment of several chemistry departments and the creation of the branch of industrial chemistry where, for the first time, chemistry cadres for production could be trained.

These achievements had great importance: they preceded the establishment of the large chemical industry and the further vigorous development of the economy and culture, thus ensuring fulfillment of all needs by highly trained chemistry cadres in industry and other sectors of the economy, as well as for higher education and scientific research.

The creation of the branch of chemistry and the dissemination of data from the chemical disciplines to other branches and specialties in the university established the need for a further increase in the number of chemical disciplines, an enlargement and strengthening of the material and laboratory base and, in general, a raising of the scientific level of chemistry teaching in the institutions of higher education.

The development and growth of the level of chemical sciences made it possible, in 1960 and 1963, to establish two new branches in the Faculty of Natural Sciences of the University of Tirana, where the training of higher cadres

required a broad chemistry background. These were the branches of pharmacy and merchandising, which, after they were consolidated in the 1970's, were transferred, respectively, to the Faculty of Medicine and the Faculty of Economics.

On the other hand, the development of chemical sciences also created the possibility thereafter to increase the number of students in both the branch of industrial chemistry and other branches of the university, as well as to raise the level of their training to a higher degree.

In the Faculty of Natural Sciences, there are now 5 chemistry departments, organized according to various fields of chemical science, such as the departments of general and inorganic chemistry, organic and biological chemistry, physical and colloidal chemistry, analytical chemistry and chemical technology. Today, these departments have 50 higher scientific teaching and scientific cadres and over 30 teaching and scientific research laboratories. Aside from these, chemistry departments have also been established in other institutions of higher education, such as those in Shkoder, Korce, Elbasan, etc.

From the creation of the university until now, over 1500 chemical technologist high cadres for production and over 1000 chemistry and biology teachers for secondary schools have been graduated. These individuals have rendered important assistance in the area of industry and in other sectors of the economy, as well as in the fields of education and scientific research.

The development of chemical sciences in our country has also increased in accordance with the tasks that have been assigned at various stages of the economic and cultural development of the country.

In executing the policy of the party with regard to the development of our socialist economy and the industrialization of the country, in the past 40 years a powerful national heavy and light industry with many sectors has been established, in which the chemical industry also occupies an important place. On the other hand, the broad applied nature of chemical sciences has caused new chemical knowledge and methods to find application in many other sectors of the economy and of social activity as well. Examples include agriculture, animal husbandry, health, construction, transport, etc. Thus, the development of industry and various branches of the economy and other sectors of social activity in our country have influenced the advancement and development of chemical sciences.

The party, guided by the principle that science should precede and actively assist production, has devoted special attention to the organization of scientific study and research in the field of chemistry. Study and research institutions were established during the first stages of the construction of the economy and industrialization of the country. Thus, in 1953, the Laboratory of Chemical Research at the Institute of Sciences was established as the first scientific research institution in the field of chemistry. Thereafter, a number of other chemical laboratories of an analytic and scientific research type were established in departments, scientific institutes, schools of higher education and enterprises. The major tasks of these laboratories have been the analysis and study of the country's raw materials in order to evaluate and utilize them as well as possible.

With the further development of the economy and, especially, with the establishment of the chemical industry and the intensification of agriculture, many of these laboratories were transformed into institutes and important centers of scientific research, such as the present Institute of Technological and Mineral Studies and Designs, the Institute of Chemical and Technological Studies and Designs for Light Industry and the Industry Food, the Institute of Technological Studies and Designs for the Chemical Industry and the Oil Technology Institute, as well as the scientific sectors and chemistry departments of the university and other schools of higher education. Similarly, in important scientific centers there are also many chemical laboratories of other scientific research institutions in the fields of geology, agriculture, animal husbandry, veterinary medicine, public health, and construction and in many technological laboratories and bureaus of industrial enterprises.

The scientific study and research work of these institutions embraces a broad variety of scientific subjects which have great importance for the development of science and the economy in our country. The results of their work have found and are finding more and more practical application.

Since it is impossible to speak about all of these, we will summarize some of the major directions of this scientific study and research work here. Scientific research work in the field of chemistry has been focused primarily on the study of our country's natural resources, in order to achieve detailed knowledge of their physical and chemical nature and characteristics and in order to determine optimum ways of processing and utilizing them. Among these may be mentioned studies in the field of mineral resources, such as copper, pyrites, iron-nickel, chromites, clays, phosphorites, quartz, etc. The results of these have found practical application in their enrichment and industrial processing. Particular importance is attached to studies in the field of fuels, concerning both the hydrocarbon composition of our oil and the most appropriate processes of its treatment, as well as to studies of the nature and processes of the coking and gasification of our country's coal. The results of these studies, aside from their value for immediate application, have opened horizons and determined directions for their optimum utilization in the future.

Similarly, great importance is attached to studies of vegetable and animal resources, directed at increasing industrial and food products and raising their quality and preserving them. More and more attention is being devoted to the study of processes of treatment of industrial and agricultural by-products and waste, in order to increase the production of chemical products and strengthen the fodder base of livestock.

Despite the results that have been achieved, the departments and other scientific research institutions are making efforts to improve further scientific directions and subjects so that still more output and effectiveness can be achieved in scientific research work for the resolution of great and important problems which the building of socialism in our country raises.

At the present stage of development, scientific research work in many areas has passed from the phase of analytical studies and laboratory experiments to studies and experiments on the larger scale of a semi-industrial pilot project and, in some cases, of technological projects and the construction of new lines and operations, relying mainly on our own forces. Among these may be mentioned the studies on copper ore and the design and construction of enrichment plants, studies to build a plant for the production of active carbon, studies to build production lines for pesticides and a number of other chemicals.

The development and further strengthening of technological studies and designs, mainly in the institutes of the ministries, will make a great contribution to the improvement and further perfecting of existing technologies and to the establishment of new lines and plants with advanced technology.

Another important factor which determines the level of scientific research in the field of chemistry is the assimilation and application of new and advanced methods of research, such as chromatography in the case of gases and liquids, spectrometry with atomic absorption, various types of spectrophotometry, electrophoresis, automatic analysis of amino acids and proteins, etc. The use of these methods has not only deepened the level of knowledge, but has increased the productivity and effectiveness of scientific work. Thus, for example, by means of chromatography in the case of gases and liquids, it has become possible to study the composition of hydrocarbons of our oil, which is very important insofar as it relates to the technology of processing, as well as to geochemistry. By means of spectometry with atomic absorption, we are able to study and know all the constituent elements of our minerals, so that a full evaluation is made and the processes of their treatment and utilization are more correctly determined. Other examples such as these may also be given.

The chemistry departments of schools of higher education and some sectors of scientific research institutions, by assimilating and putting into practice new methods of research, are playing an important role as method centers, thus making an ever greater contribution to the further development of scientific research in the field of chemical sciences.

Scientific research work in the schools of higher education has already become an important factor in further raising the level of training of higher specialists and in the postgraduate training and specialization of cadres. In the chemistry departments of the university and other schools of higher education, several dozen higher cadres have qualified at the first level of training; some of them have taken the scientific degree, "candidate of sciences." In these departments, post-graduate training and specialization of many other cadres is being accomplished by means of training and specialization courses.

The present stage and prospects for more intensive development of our socialist economy assign the chemical sciences new, greater and complex tasks. These tasks can be realized successfully if the level of scientific organization and direction of the work of departments and other study and planning institutions in various fields of chemical sciences is raised to an even higher level.

The achievements in the field of chemical sciences, in comparison with the past, are very great. From 4 or 5 chemistry teachers after the liberation, we now have over 2500 higher cadres with chemistry training and several thousand others who have completed secondary technical schools. From 2 or 3 small chemistry laboratories, we now have more than ten chemistry departments and scientific research institutes, with dozens of laboratories and science sectors at other institutes and with hundreds of chemistry laboratories at industrial enterprises and other economic and cultural organizations. Today, we have a powerful chemical industry which, with its products, is playing an important role in the intensification of agriculture and the development of other sectors of industry and the economy. Similarly, we have a powerful base for designing and building various types of apparatus and equipment. All these constitute a sound base and a great scientific and technical potential. These achievements, together with the great experience which has been gained and the creative and revolutionary spirit of specialists and all other workers in the sectors of chemistry education, research and production, are very important factors which, in the future, will proceed at an even more rapid rate for the further development of the chemical sciences and, as a result, for the successful realization of projects which the party has designated for the full construction of socialist society in our country.

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ACHIEVEMENTS, PROSPECTS IN BIOLOGICAL SCIENCES REVIEWED

Tirana BULETIN I SHKENCAVE TE NATYRES in Albanian No 4, Oct-Dec 84 pp 15-19

[Article by Stefa Kongjika, Leke Gjiknuri: "Achievements and Prospects in the Development of Biological Sciences"]

[Text] Our people are awaiting with great joy and full of achievements the great jubilee holiday of the 40th anniversary of the liberation of the fatherland and the victory of the people's revolution.

These 40 years constitute one of the most glorious periods in the history of our country. Within the long row of all the successes, an important place is occupied by the development of education and science, including the biological sciences.

Before liberation, the biological sciences were very little known. The number of biologists was very small and they were limited mainly to a few trained cadres who taught in the few secondary schools which existed at that time.

From the first days of liberation, the party, the people's government and Comrade Enver Hoxha personally devoted the necessary attention to the development of education by opening new schools throughout our country, in order to transform public education into as widespread an education as possible. The vigorous increase of schools and, in particular, of secondary schools and those of higher education also exerted a positive influence on the creation of a sound base for cadres specializing in biology.

In 1946, for the first time in our country, the 2-year Pedagogical Institute was established, which also had a branch of biology and chemistry. Later, in 1951, this branch was strengthened still further with the creation of the 4-year Pedagogical Institute. Hundreds of biology and chemistry teachers were trained by this branch for various categories of schools.

The creation of the Institute of Sciences that year included, aside from others, the biology sector (botany and zoology). It laid the groundwork for the beginning of research work in the biological sciences. During that year, despite great difficulties, under the care of the party, the sector began the study of many important biological questions which along with their theoretical value and importance, had great practical significance, since they were closely

connected with biological aspects of our natural environment. Among such problems were: the study of the flora of Albania and the flora of pastures, the study of melliferous plants, the study of weeds, the study of our country's fish, the study of harmful birds and insects, etc.

A great step forward in the direction of the development of biology in schools of higher education was made in 1957, when the University of Tirana was founded and the branch of biology and chemistry was created in the Faculty of Natural Sciences. Simultaneously with the creation of this branch, two biology departments were formed: botany and zoology, with their respective scientific sectors.

The number of students and workers in this branch at the beginning stage was limited and the material base was small, but the tasks that the party assigned were great and the prospects clear. Within a short time, thanks to the great concern of the party and the tireless labor of the workers, an appropriate environment was created with the equipment necessary to develop the teaching process in the most normal conditions possible and to proceed further in the scientific subject matter.

With the passage of time, other institutes and centers also worked in the direction of studying biological problems and, in the complex of their subject matter, they treated aspects of biology as an inseparable part of their studies. Thus, the directions of development of the biological sciences gained in stature and were extended and deepened in close connection with the increase in their theoretical and practical level.

Increased requirements in the area of biological studies, in accordance with the present and future needs of the country, have increased and continue to increase the need, above all, for qualitative improvement in the training of cadres.

During these years, our departments, in cooperation with biology specialists and workers in other institutions, within the framework of further revolutionizing the schools, have done a great deal of work to compile and perfect teaching plans and programs in accordance with the level of our new schools and the present and prospective conditions in the development of our economy. Today, we can say that the level of programs for our biological disciplines responds to the requirements for training cadres with complete, scientifically accurate knowledge which reflects the most important achievements of our time.

The creation of a 5-year specialization in our branch of biology constitutes an important success and created the possibility for a further expansion of biological culture and knowledge in the training of cadres, while responding better to the needs of our country in biology.

Inclusion in the teaching plans of some new disciplines, such as geobotany, special physiology, hydrobiology, ecology, histology and embryology, cellular and molecular biology, entomology and special courses, as well as the expansion of knowledge in some other disciplines, such as biochemistry, microbiology, genetics, the theory of evolution, etc., not only in the 5-year specialization,

but--according to the case--in 4-years too, have created a sound basis for further strengthening the level of cadre training. The development of these disciplines has led to a further increase in scientific thought in the departments and in scientific groups.

Laborious but painstaking work has been done to compile about 50 textbooks for the subjects that are developed in this branch, not including some new subjects, especially in 5-year specialization, which, for reasons of time, are developed in the form of written lectures and which will be printed as textbooks in the future. These texts are at the disposal not only of students of our branch, but also of those in pedagogical institutes of higher education, as well as of specialists and workers who are interested in the disciplines developed by these two departments. Other texts destined for various categories of schools are compiled and published by the cadres of these departments.

This documentation--reviewed, improved and provided with concise current general and particular information for subjects which are connected with construction and functional changes--has brought freshness and liveliness in the transmission of knowledge and more security in its assimilation. Continuity in expanding and increasing its scientific level remains a task for the future as well.

Utilization of a methodology at a higher level and concern for increasing more perfected means have further augmented the quality of laboratory work, an area where efforts must be greater in the future as well. Today, in our departments, 8 teaching and scientific laboratories are operating, where there is not only development of laboratory work for teaching disciplines, but also scientific research which is carried out by workers and students.

Until now, 1,144 cadres have received degrees in the branch of biology and chemistry. They are found in the four corners of the country--in schools, research institutions and production enterprises, where they render valuable assistance in the development of education, science and production.

At the present time, our departments have 21 higher cadres and cover 20 teaching disciplines which are developed in the branches of biology and chemistry, biology, medicine, stomatology and pharmacy.

Of the workers in the two departments today, 15 have a scientific degree and title, while all the others are continuing training for the first level of postgraduate qualification.

An important direction in the work of biology departments has been and remains scientific research activity and the continuing training of cadres. The major directions of this work, which had their origin in the Institute of Sciences, have not only been continued, but have also been deepened and extended in new fields and branches. Credit for conceiving, organizing and planning scientific work, as well as for training cadres in our branch, belongs to Professor Kole Paparisto, who with his wide horizon has given valuable assistance in the development of biological sciences for entire decades.

Today, the cadres of our departments have been engaged in several subjects of various nomenclatures. Work is being done not only to study flora and fauna, an area where there are many scientific publications, but also in other fields and directions, such as physiology, genetics, geobotany, experimental biology, etc. The studies of flora and fauna which are reflected in many works and monographs have reached a level today which creates the possibility for such major publications as "Flora dhe Fauna e Shqiperise" [The Flora and Fauna of Albania]. It should be mentioned that these studies are constantly including better new methods of modern research.

Studies of flora and fauna not only have a theoretical and scientific value with emphasis on national phenomena, but also excite interest in the world outside of science. Their value for many other applied sciences and for production is broad and many-sided.

In the relatively new fields of research, results are modest, but experience is being gradually accumulated and appropriate cadres are being trained, who, in the future, in cooperation with other institutions as well, will solve many problems which concern the further development of science and production. It is important to emphasize that this subject matter is based on modern scientific concepts and research methods, because current development permits a more thorough, more comprehensive and more precise interpretation of the various experimental results which are obtained. This will permit a raising of the theoretical level of research and dissemination of scientific recommendations, with greater conviction and security, in broad production. This will require greater utilization of methods of mathematics, physics, biophysics, chemistry, biochemistry and information science's in studies in these fields.

At the present time, in our departments, efforts are being made to develop further such fields of research as cytogenetics, endocrinology, photosynthesis and respiration, etc., where a review has been made of how to develop the activities of some cadres and students of the branch of biology, while better coordinating work with other institutions as well. Two national institutions are operating in the departments of zoology and botany: the Museum of Natural Sciences and the Botanical Garden.

These institutions have great teaching and educational scientific importance. At the Museum of Natural Sciences, aside from various exhibits, where the most important types of our fauna are represented, there also exists scientific resources which serves as a base for fauna studies. Mention should be made of the scientific resources of fowls, insects, reptiles and amphibians, echinoderms, etc., which are a very valuable treasure.

The Botanical Garden, although it is a comparatively new institution, is continually acquiring more of its full physiognomy. Today, we find in it about 2,000 cultivated types of flora--both native and introduced--arranged in various parts of the garden, such as that of plant systematization, ligneous and herbaceous plants, the Albanian forest, palmaceous and roseaceous plants, greenhouses, etc. Broad scientific activity is developed here in the direction of introducing plants with economic value in all areas. The Botanical Garden maintains connections today not only with institutions and production centers in the country, but also with about 70 botanical gardens in other countries.

The November 1983 resolution of the Council of Ministers regarding the development of biological sciences constitutes an aid of great importance and opens new ways and horizons for the further deepening and broadening not only of our teaching and research work, but also for institutions and production centers which are occupied with biological studies. The subject matter compiled on the basis of tasks and directives of this resolution further increases the level of complexity and cooperation and defines more clearly the most important problems of concern to the economy of our country today and in the future.

In the draft of the future 5-year plan, efforts are also being made to investigate the existing problems and to pursue, in a better manner than until now, new directions at a present-day level, in order that our studies, with their theoretical and scientific value, may render strong assistance in the further growth of production effectiveness, as the 9th plenum of the Central Committee instructs.

All these achievements are dedicated to the just and clear-sighted leadership of our party and to the teachings of Comrade Enver Hoxha.

The achievements until now constitute a sound basis for further more intensive development in our biological sciences and for placing our departments more and more in the forefront of scientific thought.

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BULGARIA

DESCRIPTION OF ES8566 COMPUTER TERMINAL

Sofia RADIO, TELEVIZIYA, ELEKTRONIKA in Bulgarian No 7, 1985 back cover

[Unattributed advertising for the ES8566 Terminal]

[Text] The ES8566 Terminal is a unit comprised of videoterminals and printers which provide an opportunity to organize remote access to computer resources.

It is employed in data gathering systems, in information-reference systems and in remote inputting of jobs. It makes it possible to solve a broad range of engineer, scientific-technical and administrative-managerial problems.

The basic modules which comprise the terminal are:

--ES8566.A010--videoterminal with built-in group control device providing contact of the terminal with the computer;
--ES8566.A030--printing terminal;
--ES8566.A021--color symbol-graphic videoterminal;
--ES8566.A031--dot-matrix printing terminal;
--ES8566.A040--keyboard;
--ES8566.A050--light pencil;
--Magnetic card reader.

The ES8566 is built on the basis of the SM600 series microprocessor using multilayer printed boards.

The functional capabilities include:

--Modular structure;
--The possibility of using SDLA/SNA or BSC protocols;
--Inputting of graphic information;
--Color image;
--High operator productivity;
--Efficient use of communications channel;
--Equipment for limiting access to system;
--Built-in control devices.

The ES8566 is designed to be used as part of the ESTEL4.2 teleprocessing system or analogous compatible configurations while the SDLC model comes only in the ESTEL4.2 system. The use of the terminal with the unified system of the Ryad3 computer is provided by the OS6.1 and OS/351 operation systems, in employing the virtual telecommunication access method (VTMD).

10272
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BULGARIA

CAUSES OF RESISTANCE TO NEW TECHNOLOGY EXPLAINED

Sofia POLITICHESKA AGITATSIYA in Bulgarian No 14, 1985 pp 36-40

[Article by Candidate of Philosophical Sciences Petur Ivanov: "A Mental Barrier Against Scientific and Technical Innovations"]

[Text] Can this mental barrier be overcome and by what methods and means?

With the accelerated introduction of scientific and technical progress, a number of sociopsychic problems arise along with the organizational, technical, production and economic problems. These relate to overcoming the sociopsychic resistance to innovations and to creating an optimum sociopsychic climate for these and may involve directly the individual, the social group or the collective. Usually in practice the required attention is not paid to these questions. The fact is ignored that the activities of people in an economic unit are subordinated to psychological and sociopsychological laws. Often unresolved questions related to the collective psyche are passed over.

Clearly this approach is not correct both from the financial, the social and ethical considerations. In improving production and in introducing scientific and technical innovations, it is essential to also bear in mind the sociopsychic measures of man: particular features of volitional actions and cognitive processes, forms of mental response, adaptation mechanisms, collective opinion and emotions, mood, feeling and so forth. This was emphasized by the materials of the February Plenum with the thesis concerning the role of the scientific-technical revolution as "...a great means for human progress," for improving and enriching human labor and life as well as human capabilities and creativity.

The introduction of any new technology, any new equipment or new organization, regardless how carefully thought out and natural it may be, always has two aspects:

1) The upsetting of a number of existing norms, stereotypes, relationships, functions and trends;

2) The imposing of qualitatively new requirements stemming from the very newness of the introduction including higher skills, greater responsibility and new obligations.

From the sociophychological aspect, introduction itself is a critical, stress period in the life of a collective. This period is characterized by: an intensity of collective and personal experiences, by the incorporation of changes in the entire system and entire orientation and adjustment of the individual, by new phenomena and processes in the sociopsychic climate in the collective. Often a certain mental tension is formed in the collective, that is, a mental barrier against the innovation is established. This must be overcome in order to fully achieve the aims of the collective and of production in the area of accelerating scientific and technical progress.

A mental barrier means the response of the collective, of a part of the collective or individuals to the technical or scientific innovation whereby consciously or unconsciously, covertly or openly a negative attitude is expressed and they act accordingly.

With introduction which presupposes revolutionary thinking and creativity in action, the mental barrier also includes an indifferent attitude toward the problems of scientific and technical progress. Indifference and passivity on this level assume the configuration of resistance or of a barrier. In this instance the position which can be held both by the managerial personnel as well as by every other member of the collective is an alternative. This is expressed by one of two permanent states of readiness to respond in a definite way (positively or negatively) to a specific scientific and technical improvement.

The register of negative responses (mental barrier) is very great. This begins by a completely passive attitude toward the problems of scientific and technical progress, innovation, inventing and so forth and ends by active, strong resistance expressed in actions, usually covert, which are aimed at preventing the innovation.

The reasons for the development of a mental barrier can be defined most generally as objective and subjective. The objective ones relate chiefly to contradictions and difficulties which actually occur in designing, material supply and organization with scientific and technical improvements. Of greater interest from the sociopshcyological aspect are the subjective ones which have their roots in the individual and in his activities. Some of these are due to the inclination of a man to respond negatively to effects on already created stereotypes. Another type of subjective factor is chiefly as a result of errors and oversights relating to scientific and technical development: methodological shortcomings and inaccuracies, a lack of preparedness (personnel, organizational, mental and so forth) of the collective, insufficiently effective leadership over the introduction and so forth. In addition to this there are also subjective factors which are an expression of narrowly understood departmental, collective and personal interests as well as "...the desire to preserve the privileges of power" as was emphasized by Comrade Todor Zhivkov in the introductory speech at the February Plenum, insofar as in certain instances these privileges are seriously restricted by the introduction of a scientific and technical innovation.

The manifestations of the mental barrier are the most diverse.

Let us point out the most important ones discovered in several sociological studies conducted in Ruse Okrug in this area:

1) Fears of a cutback in personnel, the loss of bonus remuneration guaranteed by the old working condition;

2) A reticence to retrain as required by the scientific and technical innovation;

3) A fear of the need to take on more work which had been "alloted sparingly" up to the present, a fear of risk and a lack of confidence;

4) Fear of increased demands in the profession;

5) A conviction that only the showcase value of the introduced innovation was being sought;

6) The view that the money used on scientific and technical progress could have been more effectively spent;

7) Skepticism over the qualities of the introduced innovation and so forth.

All of this has not only a psychological sense but also a real reflection in the life and activities of the collective, in the conduct and actions of individuals and in their work and social activity.

Albeit very rarely, there still are individual members of a collective which more actively resist innovations. Usually the resistance is not apparent but is expressed in so-called "cosmetic measures," that is, a fictitious, external change while maintaining the old essence or, in other words, only "the reporting is new." But there are also instances of overt resistance, of purposeful and well founded actions. Certainly it is another question of whether these actions are valid or not.

An unsurmounted mental barrier impedes the introduction, it causes complications in the social life of the enterprise or organization, it influences the quality of the very introduction of scientific and technical progress and ultimately production itself.

A mental barrier also has a certain positive role and function, particularly when the introduced innovation is not effective, it is not timely, it is not adequate to the social and production conditions and is not in accord with the corresponding requirements.

The analyses and conclusions made indicate that the negative processes and phenomena arising in the collective psyche against scientific and technical innovations must be mastered. The methods for this can be divided into two main groups:

1) Methods relating to the direct overcoming of mental resistance in an individual;

2) Methods for creating an optimum sociopsychic climate and adequate acceptance of scientific and technical progress by the collective, by the enterprise or the organization.

In the first group are the methods aimed at the intellectual, emotional and volitional sphere in the psyche of the individual.

Here the principle of persuasion is of the greatest significance. An individual must be convinced of the utility and effectiveness of the scientific and technical improvement in production in a specific instance. It is also possible to employ the method of suggesting certain ideas but this must be done only in rare instances as it eliminates a creative, critical attitude to the problem.

Particularly important is the question of the personal example and authority of those carrying out the introduction, of the leaders. Here it is essential to use better the authority of the informal leader in the corresponding social microgroup.

In the volitional sphere it is essential to have a certain encouraging of the efforts of the workers, white collar personnel and leaders which they make in the stage of introduction and with the success of the scientific-technical improvement of production. Here a correct combination of material and moral incentives is of great importance.

In relying on the collective to act as a whole, it is essential to have better coordination of the motives, goals and actions in collective labor activity.

It is also essential to effect the interpersonal dealings, interpersonal relations, particularly the "leader--subordinate" and "individual--collective" relations in order to create an optimum sociopsychic climate in the collective. This requires the centering of organization and a comprehensive approach to the problems of introduction, including the sociopsychic ones.

Here are some of the means for overcoming the mental barrier (using data from sociological research in Ruse):

1) The correct and prompt providing of information on the forthcoming specific innovations or reorganizations. It is possible to use a system of lectures, courses, seminars, exhibits, meetings with specialists, talks and so forth. The collective as a whole must hold a correct and affirmative view of what is to be done;

2) Purposeful and effective socioindoctrinational work;

3) Analysis and elimination of those aspects of the scientific and technical innovation which upon introduction would cause mental stress and negative responses by the collective and its individual members;

4) The more effective use of advanced experience in Bulgaria and abroad;

5) Proper supervision and assessment of the efforts made by the individual worker or employee in the introductory process;

6) There must be retraining of the leadership personnel for the problems of the organization of scientific-technical progress, for the specific features of the "science--production" mechanism with the incorporation of a sociopsychological course on these problems;

7) Attention must be paid to the ergonomic optimizing of working conditions (background music, a correct balance of rest and labor, the interior spaces and so forth) after the introduction;

8) Forms and means must be sought to "democratize" scientific and technical progress, for example, the collecting of critical comments, opinions, proposals and so forth from the members of the collective in the area of the introduction, their analysis and use.

It is also possible to point out many other forms and methods for overcoming a mental barrier. But most crucial for their effectiveness is the need to establish specific programs for the adaptation for every collective. Programs compiled after a careful study and discussion of the specific conditions by the party and administrative leadership, by the trade union and Komsomol aktiv with the requisite participation of representatives from the organization in charge of the introduction.

It is essential to have a differentiated and comprehensive approach to the overcoming of mental barriers. The measures should have a preventive nature, and one must not wait until the appearance of mental resistance and only then begin to work for its overcoming.

It is possible that in some enterprises or organizations introducing scientific and technical innovations the given methods and means will contribute a great deal while in others they will be useless. In such an instance the overcoming of a mental barrier is a question of the capabilities of the enterprise leadership in this area and of its attitude toward this problem. It must not be forgotten that this is of great social import and any indifferent attitude toward it, particularly at present when the struggle for higher quality and effectiveness is in the forefront, is inadmissible.

10272
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CEMA COOPERATION IN R&D PLANNED

Prague RUDE PRAVO in Czech 18 Sep 85 p 2

[Text] Questions of international scientific-technical cooperation, the securing of the tasks set by the 8th Session of the Central Committee of the CPCZ and long-term work over the next 5-year plan were discussed by the meeting of the State Commission for Scientific-Technical and Investment Development. The discussion was directed by Jaromir Obzina, deputy premier of the Government of Czechoslovakia and chairman of the State Commission.

In his introduction Comrade Obzina stressed that the current work aimed at perfecting cooperation between CEMA member states can be characterized as a joint effort to formulate and render specific the main documents dealing with the intensification of development in science and technology and by efforts to unify scientific and scientific-technical foreign policy, and orienting it toward the principal directions of development being experienced by science and technology. Emphasis is being placed on the application of higher forms of mutual cooperation and a substantial growth in its efficiency. For example, the total contribution of scientific-technical cooperation in the 8th Five-Year Plan is expected to reach 24 billion korunas for Czechoslovakia and rise to 41 billion korunas in the 9th Five-Year Plan.

With respect to selected scientific-technical problems research and development work programs are gradually being worked out and approved, as are detailed plans submitted by cooperating organizations. The latter contain particular emphasis on the targets of investigation efforts, principal technical-economic parameters, deadlines and forms of cooperation. On this foundation a number of documents are being prepared, the most significant of which is the Comprehensive Program of Scientific-Technical Progress in CEMA Member States for the next 15 to 20 years. It will contain the strategically most significant directions of development in science and technology, whose solution will make it possible for CEMA member states to make a more rapid transition to intensive development. These are programs of electronification, comprehensive automation, the speeded-up development of nuclear energy, the development of new types of materials and the technologies involved in their production, and problems in biotechnology. For example, the tasks specified in the first program are already the subject of 20 concluded and prepared agreements.

In the discussion members of the State Commission, among others, stressed that much higher efficiency can be attained in the area of purchasing and selling licenses. In the current period 1,000 valid passive and 700 active licenses are recorded. One of the serious shortcomings is the lack of conditions for the preparation of documentation, both at enterprises and in the general directorates and the concomitant negotiations. As mentioned in the conclusion of this part of his address by Minister Obzina, it is necessary for the sale of licenses to be reflected in the economic results of enterprises and institutes.

5911
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GERMAN DEMOCRATIC REPUBLIC

COORDINATION OF ESER SOFTWARE, APPLICATIONS RESEARCH DISCUSSED

East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 pp 4-5

[Article by Dr J. Vogel, factory manager, Berlin VEB Management Center for Applied Research: "Results of Cooperation Between VEB Management Center for Applied Research and VEB Robotron-Projekt Dresden"]

[Excerpts] Key Role of Software

Microelectronics makes possible and demands a qualitatively new software for:

--Dealing with increasingly extensive amounts of information;

--The increasing integration of information processing;

--The transfer of information processing from man to machine.

The Robotron and Data Processing combines bear particular responsibility for the development and propagation of appropriate systems technology--that is, of both hardware and software--within the framework of the national economy of the GDR. The many years of coordinated cooperation between the two combines are particularly intensive in the teamwork between the State-Owned Enterprise [VEB] Robotron-Projekt and the VEB Management Center for Applied Research.

Themes of Cooperation

The basic concern of the division of labor is to provide software approaches in tune with one another for application in the installation and equipment systems of the ESER (Standardized System of Electronic Computer Technology in CEMA Countries) and SKR (System of Small Computers in CEMA Countries), in order to better enable the areas and branches of the national economy to put multivalently useful software in use.

The fundamental basis for successful cooperation is the scientifically based difference of opinion concerning the formulation of problems and strategies for an approach, as well as the formation of development collectives, which with an orientation to performance and marked expertise are developing perfected solutions that lead in practice to important economic effects.

Software Technology

The projection of data processing approaches of a more or less complex character calls for enormous scientific and technical capacities.

The "scissor effect" of what is needed and what is available in order to satisfy this as planned threatens to open up even further unless the process of data processing projection can be successfully intensified using computer technology. The data processing projections cannot become--besides data acquisition--the eye of the needle in the application of EDV [electonic data processing].

This was the point of departure for the conception and gradual development jointly by the two enterprises of a "software technology program" in order to provide (extensive) support to an engineering-based plan of action in software development on a methodical and computer technology-oriented basis. The VEB Management Center for Applied Research provided basic tools for the support of software development, which are intended and suitable for use by everyone in the national economy making use of EDV.

Data Base Operating Systems

Up-to-date methods in systems technology should enable a rise in the degree of utilization of stored data, with a qualitative approach such that they correspond to the interface of informational connections between different subject areas.

Data base systems occupy a central position in the use and further development of information technology. Data base operating systems give support to an efficient data storage, access and processing organization.

One example of cooperation in this area is the DBS/R [Data Bank Operating System/Robotron] Data Bank Monitor (the Executive System). This Data Bank Monitor was developed by the VEB Management Center for Applied Research on behalf of Robotron.

Both universal and specialized administrative systems are in practical application. Assuming specific requirements for use, the DBS/R system (VEB Robotron-Projekt)--oriented towards the CODASYL [Conference on Data Systems Languages] program--and the TOPAS system (VEB Management Center for Applied Research), which provides support for relational structures, are available for the implementation of data bases. In addition, further data base operating systems have been implemented in the state-owned combine for data processing: DAFEMA (DVZ [Data Processing Center] Magdeburg) and SPAZ (DVZ Statistics).

For computer-supported projections of data bases on the basis of these systems, an efficient design system, especially for the interpretation of effective data structures, is being prepared with DBEH (Data Bank Design Assistance) and jointly marketed by the two enterprises.

In order to make possible the necessary future development of "dispersed" data bases based on a combination of ESER and SKR technology, a TOPAS

implementation of SKR systems (K 1630, CM-4) is available in 1985. A fundamentally identical functional diagram will in this way be made available to the user independent of his computer-technological resources, which thus supports the move in the direction of tying in the advantages of data communication with those of data base work.

Experience from the application of data bases and new goals in this area present the developer with the task of proposing and (mutually) accepting to a greater extent the standardization of interfaces, as independently of the concrete equipment aspect of the implementation as possible.

Beginnings in this direction, across national borders as well, have been made with the Data Bank Seminar for socialist countries, which has been held every year since 1979. The 1985 seminar, which the GDR will be supporting substantially with representatives of the VEB Management Center for Applied Research and the VEB Robotron-Projekt, will take place in Piestany, Czechoslovakia from 30 September to 4 October.

Computer Network Software

One essential direction of present and future development and application of products of electronic computer technology is increasingly aimed at the realm of communication. This makes possible rapid transmission, or the rapid exchange of information; however, not only stored information, but also the computer output is accessible "at all times" and "in all places." The fusion of information and communications technology through suitable software packages (and technology) is a further embodiment of cooperation. Terminal and computer network software for installations and equipment systems of ESER and SKR, based on the basic program support provided by the VEB combine Robotron, are important to a workplace-oriented job of information processing that keeps temporal pace with the process.

For more than 10 years, specialization and cooperation in the area of operating systems development within the framework of the ESER have been carried out successfully. The basic access methods for data teleprocessing approaches BTAM [Basic Telecommunications Access Method] and TCAM [Telecommunications Access Method] in accordance with the printout modifications in the OS operating system are products that are being developed, looked after and transferred into practice by collectives of the VEB Management Center for Applied Research on behalf of the VEB Robotron-Projekt. This line of development also encompasses the software side of "supplying" teleprocessing technology, for example as in the EC 8404 and EC 8404.M multiplexers. These software packages, which are implemented via the Robotron marketing organs, effectively support the use of terminal networks and form the foundation for approaches in computer-computer communication. This in particular demonstrates that it is possible (and in part necessary) to develop software this complex and complicated through various producers, based on the division of labor.

Significant to this are the achievement of a unified development strategy, the establishment of coordinated interfaces, the formation of development collectives, whose work is in the long term to be geared to specialized areas, and the safeguarding of management requirements in leadership, organization and supervision of developmental and transitional tasks.

For the computer communcations network of the State-Owned combine for Data Processing (and for other areas of the national economy of the GDR), the Computer Communications Software (CCS) was developed, and this has been successfully in use for 2 years. In this way, the networking of the computer technology resources of the ESER and SKR systems is realized via lines of telecommunications, and "distributed" data processing on computers of differing magnitudes is consequently protected.

Outlook

The outline of the successful cooperation of the scientific-technical centers of the Robotron and Data Processing combines indicates clearly that teamwork in the area of software production is more necessary than ever.

In accordance with the interests of the user, attention should be directed as a matter of priority at further rationalizing the process of software development through appropriate (computer technological) means, and at structuring basic program support or software packages close to the system such that extensive integration is safeguarded and any existing system incompatabilities can be eliminated.

This scientific-technical cooperation, which is the product of ambitious objectives and trustful common effort, should be expanded in order to put into practice even better and more quickly information and communications technology for an increase in performance in the areas and branches of the national economy.

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12271
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GERMAN DEMOCRATIC REPUBLIC

ROBOTRON BRANCH VEB TASKED WITH SOFTWARE DEVELOPMENT

East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 p 97

[Article by Dr H.-J. Lodahl, factory manager, VEB Robotron-Projekt Dresden]

/Text/ The VEB /State-Owned Enterprise/ Robotron-Project Dresden has been in existence since 1 July 1984 and has more than 1,000 employees at its disposal, mostly college or trade school specialists.

The enterprise is located in the center of Dresden at the following address: VEB Robotron-Projekt Dresden, GDR, 8010 Dresden, Leningraderstrasse 9.

The basic line of the policy of the government of the German Democratic Republic, to do everything for the well-being of the people, demands a continual rise in effectiveness.

In part because of this standpoint, the VEB Robotron-Projekt Dresden was founded on 1 July 1984 within the Robotron combine. In so doing, many experts in the area of software development were brought together in an economically and legally independent enterprise whose purpose is to develop, in conjunction with its cooperative partners inside and outside the combine, multivalently useful software, through contributing to goal-oriented accomplishments in the application of computer technology and by realizing complex plans for applications.

In establishing the VEB Robotron-Projekt Dresden, consideration was given to the objective legitimacy of the fact that the significance of software supplies, their use in the national economy and the rise in quality of software are continually growing.

The VEB Robitron-Projekt sees an important task in putting the user in the position of effectively developing modern software, by providing modern technological means and tools. In the development of software, this requires that technological discipline be asserted and that as early as in the allocation of tasks, allowances be made for the goal of reusability through clear structuring, the establishment of interfaces and the use of high-level

languages. In this way, possibilities for reusability are opened up and prerequisites for the export of software as an immaterial service are created.

In practice, the problem of safeguarding a high quality of software and recognizing errors early in the process of development is playing a growing role. The cost of eliminating an error that appears during use is approximately two to the tenth power times higher than during the logical design stage.

This is why a quality safeguarding system has been worked out in the VEB Robotron-Projekt Dresden, which is currently being used and gradually perfected.

The quality safeguarding system is oriented towards steps that can be implemented in practice and that can be used by every developer. Used together with the available technological means and equipment, this means that an effective step in raising the quality of software will be achieved.

In determining its development strategy for software production, the VEB Robotron-Projekt Dresden attaches particular importance to long-term, stable features. It specializes in the following areas:

Data base operating systems, communications approaches, mathematic processes and compilers for high-level programming languages. In addition to the safeguarding of upward compatibility for certain classes of computers, the software products using high-level programming languages are being developed to an increasing extent with a portable capability, in order to further raise the extent of use.

To safeguard a high quality of application of the software products, the VEB Robotron-Projekt Dresden offers advisory services, guarantees the quality of its products and assures the maintenance of its programming systems on a long-term basis.

In addition, the VEB Robotron-Projekt Dresden is a reliable partner for customers who are building up complex applications systems. Using its own software, it is achieving results in allocating complex applications systems, for example in management information systems and in producing software for industry, such as the metal-processing industry, the hotel industry and banking.

The articles in issues 4 and 5 present selected products and approaches that have been developed by the VEB Robotron-Projekt Dresden or in close common effort with proven cooperative partners. These descriptions cannot be complete; they should make it clear that an achievement-oriented software development enterprise has come into being in the Robotron combine, which is always a reliable partner for its customers at home and abroad.

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On Our Cover

One can see on our cover a training device for air traffic controllers developed at the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]. The essence of the system is that the students are put into an environment which faithfully simulates reality so that they feel that they are guiding real aircraft. In actuality computers in the background create this illusion according to a predefined program. How is the illusion created? The instructor, who naturally is not a computer technician but rather an expert in control technique, prepares the exercise with the aid of the central computer of the system (a GD80 DP). His work is similar to filling out blank forms in the course of which he knows every detail--the geographic elements of the airfield, the weather conditions, the properties of the radars and the courses of the aircraft. A computer controls the exercise and records it on magnetic disk. Any exercise can be initiated from a magnetic disk. The central computer performs the simulation of the flight of the aircraft. The positions and speeds of 64 aircraft are

computed each second according to the program and the data are forwarded to the control station. The four control stations are just like the real equipment. The most important element is the GD80 BT playing the role of the radar indicator; it displays the map of the airspace on the basis of the data received. With the aid of a keyboard the controller can perform operations on the picture--he can magnify, slide over and measure distance. He can give instructions via radio-telephone to the pilots of the aircraft to perform the necessary maneuvers. The pilots listening to these instructions are sitting at the terminals of another computer (a GD80 KC) and they respond to the instructions of the controllers; if necessary they pass this on to the computer with the aid of their keyboards. This computer sends the instructions to the central computer which modifies the original flight programs accordingly. The instructor controlling the exercise has a separate observation station from which he can check the air traffic situations which develop and can listen in to the radio conversations. The central computer prepares a "photograph" of the entire exercise on magnetic disk and thus the work of the student controllers can be played back and evaluated. The system has been in operation since July 1984 at the Ferihegy Flight Control Training Center and is expected to be a tool in the training of future controllers.

Shop

Our SHOP column always introduces some research and development site. In Issue No 2, 1984, we described the KFKI [Central Physics Research Institute] and now we describe the work of the second largest research institute of the MTA, the SZTAKI. Pal Verebely briefly summarizes the research work taking place in the electronics main department.

The other articles of the SHOP column can be viewed as nice examples of the social spread of electronics. The agricultural and medical applications of computers indicate the penetration of electronics and computer technology into areas thus far uncommon in Hungary. The description of the computer-controlled manufacturing cell and the drive system for a nuclear power plant cassette reloading machine are examples of modern applications of electronics in control systems.

Micro Hardware

The constant theme of our MICRO HARDWARE column is microprocessor structures. Following the 8 bit processors we are starting to describe the 16 bit families, which Gyorgy Krizsan starts off with the Z800, which can be regarded as a transitional type. Space is given in this column to Bela Lovas' article on various memories. From the viewpoint of this arrangement, we have regarded the inseparability of processors and memories, as the most important hardware elements, as fundamental.

Circuits

The goal of our CIRCUITS column is to provide little ideas which can be used in practice to solve some partial circuit problem. It may be that the part described--obtainable from the socialist countries--or a special connection may offer aid to the designer. Sometimes we describe connections with which an

entire circuit can be prepared. This is especially true if we are describing an idea of domestic designers, as we do now for the first time. We call the attention of contributors to the fact that we will publish only circuits which have been built and are working well, and we will reward these with a year's subscription to MAGYAR ELEKTRONIKA. We are awaiting circuit ideas which are useful to others.

Advertisements, New Products

Advertisements and product descriptions have been an important part of our journal from the beginning. We make no secret of the fact that without these the financial balance of our paper would be unimaginable. But it is also our goal to propagate information about new electronic products, whether they be parts or equipment. After the SHOP column you will find a four page color supplement and at the end of the journal you will find the first more detailed domestic description of the NMOS ULA circuits of the MEAT.

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LASZLO PAL DISCUSSES POLICY

Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1985 pp 4-8

[Interview with Laszlo Pal, main department chief in the National Technical Development Committee, by Dr Peter Horvath]

[Text] [Question] On 22 November 1984 the Council of Ministers adopted the concept for a "Central Economic and Organizational Program Embracing the Economic Guidance Tasks for the Spread of the Socio-Economic Applications of Electronics" (EEKGP). Although it would be difficult to further condense the many tens of pages of material, could we ask you to try to summarize the goals and priorities of the concept.

[Answer] This program rests on four columns and formulates what is to be done for the government's part. It does not embrace all the tasks of spreading electronics in Hungary; it leaves out the roles of branches, enterprises, institutes and individuals. The four columns are the following:

-- First we must create a medium suitable for mass acceptance. Hungarian society must be provided with an attitude, a cultural and professional preparation, which is capable of accepting the results of the new technology.

-- The second column of the concept is improving the attention of the enterprises, creating regulations and an economic environment in which--at least--nothing will oppose the spread of electronics. If within this something else supports the spread of electronics then this is a separate good point.

-- The third emphasis is that the state should see to the creation of electronic infrastructures and of an infrastructure for electronics itself. This includes, for example, the telephone network, but it also includes the development of institutions providing certain services and other things.

-- Fourth and final point; we must provide the conditions necessary for the acquisition of equipment, tools and systems needed to carry out the program, including the creation of domestic industry and import possibilities.

These are the four legs on which the concept rests. There are a number of fundamental elements, and we have not yet talked about the goals. The government has come to the recognition that by the end of our century

electronics, and primarily the use of electronics, will be the most important carrier and one of the most important determinants of technical progress. Analyzing the Hungarian situation it has been shown that the force, energy and money turned to the utilization of electronics in Hungary is a fraction of what is spent in the world in general, but especially by the developed countries. It has also been shown that there is an extraordinarily close interrelationship between the use of electronics and the ability of countries to produce national income. Studying this and taking into consideration the aspiration already contained in the congress guiding principles--that we must find conditions for a more dynamic development of the economy--the government considered it necessary to make substantial progress in the use of electronics. As to what electronics is good for, I believe the readers of MAGYAR ELEKTRONIKA know very well.

The program has other important elements, priorities and emphases which can be examined on another level. It defines what sort of investments and developments the state must play a key role in; it determines what must be done at the most varied levels for the development of education, from the general schools through the secondary schools and institutions of higher learning and in further training and, what is very important, in retraining. We must prepare for the fact that this program will change the structure of the labor force in this century, and the labor force must be prepared to be able to convert to the new technology. The state will provide the concrete investment conditions and other resources necessary for this.

[Question] In addition to the OMFB [National Technical Development Committee] the Ministry of Industry, the KSH [Central Statistics Office], the MTA [Hungarian Academy of Sciences] and the Hungarian Post Office took part in preparation of this concept. Does this indicate the emphases of the goals?

[Answer] To a certain extent it does, although the preparation of the concept was much broader than this. The Plan Committee determined what sort of alternatives must be worked out for the measures to be taken for the development of the telephone network. The most essential element of the decision was that the development will be at a faster pace than in any past period. Guaranteeing the material assets for the developments needed to carry out the tasks of computerizing state administration belongs to the area of state decisions, but the state must also guarantee the cooperation or coordination of these systems. It is a real and concrete task of the state to finance all those R&D tasks connected with the spread of electronics which are to be stressed at the national level. We are now working out the conditions for this research and technical development program.

The program will be complete if the branches and those involved in matters belonging to the various branches, in addition to the government, prepare their own action programs to carry out the timely electronics tasks in their service areas. The approved concept contains four inter-branch programs, which coincide with the previous priorities and contain 18 branch program concepts. These documents--called part programs--should formulate what ideas the various branches consider important and what other processes they intend to modernize through electronics. They should define how the branches will organize the cooperation of their enterprises. They should contain concrete projects and

indicate more or less the way they will be financed. This means that there is no significant institution, institute, enterprise or other organization in the country which is not affected by this concept in some form at this stage.

In addition there is another very important element--somewhere the program sets forth the goal that we should socialize electronics. Electronic solutions should receive a role not only in the economy but in the other spheres of society as well. So it presents a number of concrete ideas which are partly in the research and development stage and partly in the stage of economic measures which represent new electronic applications for society as a whole.

[Question] A question arises for me, How will the enterprises and institutions feel the significance of this?

[Answer] There was a very interesting antecedent to the work of preparing this concept. We made direct contact with about 250 institutions and enterprises and tried to clarify how they saw their own role in the development of such a program, where they would place the role of electronics within their own activity. The enterprises played a very active role in this question-answer game. We found that they were prepared conceptually for a spread of electronics at a pace substantially faster than earlier.

[Question] Let us select one theme. A modern telecommunications network is an indispensable condition for the spread of electronics. The construction or design of integrated, digital, optical fiber telecommunications networks has begun in a number of countries in the world, that is, the integration of the computer and telecommunications. In Hungary we are struggling with elementary telephone problems. What does the concept say about this? Can we take this into consideration already or can we aim at only a medium level for the time being?

[Answer] The present government decision does not say what the developmental pace will be currently, between 1986 and 1990. A decision in this question will be made at the end of the first quarter of next year, but the concept does define the directions in which the development of the telecommunications network must take place. We entirely agree with our colleagues, with the Post Office, the Ministry of Industry and other organs of the government, that a qualitative development of our existing network is very timely (I am thinking of reconstruction primarily). The quantitative development must be carried out at a faster pace than we have done thus far, and in a number of respects the Post Office must introduce new services and new technical solutions. One must mention first among the new services starting the regular operation of the various telematic systems between 1986 and 1990; this means everything from a passive graphic newspaper through telecommunications links for office automation to starting up the Viewdata and Telefax type systems.

[Question] Is there any chance that we will have computerized networks?

[Answer] If you put it that way there is already a computerized network in Hungary in general, but it isn't satisfactory. Unfortunately building up a uniform Hungarian service computer network is not timely in 1986-1990. But, among the developments of postal services, an expansion of the existing NEDIX

center more than two and a half times is one of the tasks which will be realized by the end of 1985. This means, and this follows from the program too, that optical communications will spread, the electronic telephone exchanges will introduce a number of services in the next plan period, but unfortunately not on such a mass scale as a true Hungarian citizen would like in his soul. But these processes will be accelerated. Finally, there are other telecommunications aspects to the program.

[Question] The Hungarian electronics industry must assume an increasingly important role in such a program. At the same time it is supposed to take on more export, both to the socialist countries and to countries with convertible currency. In accordance with the concept, is domestic industry capable of this and will there be sufficient economic assets to carry out the tasks?

[Answer] What is the role of industry in this program? The number one thesis is that this concept is not a program concerning the development of an industry to manufacture electronic equipment; it is an applications program. But it does define the demands made upon the electronics industry. It orients industry to undertake a greater role in satisfying domestic demand. This is necessary for a number of reasons. In the first place because the possibility of socialist import does not yet satisfy domestic needs in terms of variety or service and the capitalist import possibilities are limited partly by the ability to pay and partly by the readiness to deliver. So a greater task will fall on Hungarian industry in solving the problems of the domestic market.

It would not be useful to prepare an industrial development program in Hungary today, with one exception to which I must return. Given the normative rules for enterprise operations and the state support for research and technical development there is a possibility that with good use of credit conditions and exploiting international technical-scientific cooperation our enterprises will make progress on their own. So this does not require a government program. But in addition to this the concept will make concessions or give preferences to enterprises, including industrial enterprises. We are working on the details of this. Equipment manufacturing enterprises will get preferences in adopting new technologies, in simplifying access to the most modern parts, and in the prices of certain productive parts, subassemblies or products, by reducing the purchasing prices. Duty preferences and other means will help industry to stand on its own feet.

[Question] This program is a program for the application of electronics. How does the continuation of the central development program for the manufacture of electronic parts and subassemblies fit into this?

[Answer] This is the area where it was decided that an independent central development program parallel with the program to spread electronics should be created within the framework of government work; more precisely, the central development program for the parts industry, already begun, will continue. It was a very important decision that the EKFP [Central Development Program for Electronics] should not get dissolved in the whole thing, because this is a fundamental developmental task for industry. The experts are working on the details of the parts program too, the basic ideas have been blocked out. Our goal is that the development of the parts industry should be at a faster pace

in the next 5 years than the pace at which the equipment manufacturing industry develops, for we cannot let the gap between the two branches increase.

[Question] So, has the difference between the performance of the parts industry and the needs of the equipment manufacturing industry decreased in the past period?

[Answer] I believe that now, at the end of 1984, I will have to say that it has not; but conditions have been created for such a decrease. In the past 4 years in Hungary, within the framework of this EKFP, certain technological investments have been started or completed, investments are continuing in new areas, and the domestic manufacture of modern integrated circuits has begun. So the basis is there for a reduction in the gap. This could hardly have been demonstrated in the past 4 years for manufacture has just now started.

[Question] Will this be sufficient only for domestic supply or will they be able to increase export as well?

[Answer] In no way can it be sufficient for domestic supply, because this was not what this parts industry was set up for. Domestic needs for some parts will be satisfied. We are talking primarily about microelectronics. We must prepare to design and manufacture the equipment oriented circuits. The manufacture of such circuits has begun already, but not yet in the desired volume or variety. In this regard the Hungarian needs really must be satisfied. But to do this economically the Hungarian parts industry or microelectronics parts industry must manufacture large volumes of certain catalog circuits to carry the overhead, not primarily for Hungarian users but to lay the foundations for a commodity exchange so that the variety in catalog circuits can be provided primarily from import.

[Question] Still, we shouldn't avoid the part of the question which pertains to the equipment manufacturing industry. Will the Hungarian equipment manufacturing industry be competitive, will it be able to increase export?

[Answer] In recent years the equipment manufacturing industry as a whole has increased export. But this is going under more difficult circumstances and with much more pain than earlier, and there are signs that it will be even more difficult in the period before us.

Let us return for a moment to two questions. First of all to the parts area. We have not achieved the goal in passive and electromechanical parts. The financing difficulties of the enterprises appeared substantially more quickly than we had thought, so here the investments got started later than planned.

[Question] There may also be technical reasons for this, although it is generally believed that the manufacture of microelectronics parts poses much greater technical demands. Can it be imagined that there are even greater difficulties in precision engineering?

[Answer] The technical causes were not the determining ones. There are also complex technical conditions in precision engineering, and not only there but

also in primary material supply and other questions. These can be solved, or most of them can be solved, but now it is actual money problems which hold back the development of this part of the program.

Another question, which I wanted to return to, is a requirement posed by the program in regard to the equipment manufacturing industry. The requirement is that it must satisfy domestic needs to a greater degree, that we should have a smaller export orientation as our goal. This is not because export has become difficult but rather because there is greater need for the products here at home. But going beyond this, there are also internal structural requirements for the industry, for example increasing the proportion of intellectual work. It is unimaginable on the small domestic market that sales to users will be massive at the OEM level. To a much greater degree than before the industry must prepare to better satisfy concrete user needs. This applies to the concept for the industry and to the concept for software manufacturers, but it also applies to the work being done with the participation of systems developers and systems analysts, and to many others as well. So somehow the various scientists and the products of the electronics industry must be integrated.

[Question] You mean we must increase entrepreneurial activity?

[Answer] Precisely. Industry for its part has to try harder. A very strange situation has developed in applications, that at the level of needs we are now among the most cultured and most prepared electronics using countries in the world, but not at the level of applications abilities. The increased need in this regard must be satisfied by Hungarian industry, if it wants to stay on the market here at home. The competition is great. The socialist countries would like to sell more and more.

[Question] Is not one cause of this lack of flexibility the preponderance of large enterprise, virtually monopolistic organizations?

[Answer] No.

[Question] The small units are just as inflexible?

[Answer] The big ones are not so inflexible when the foreign markets are involved. The big ones are putting together serious systems, in computer technology and automation for example.

Where they have to fight for the market, and I am including the socialist export market today as well, the enterprises are able to show that they are capable of flexibility. The little ones are apparently flexible within the framework of a given task area. But if the task area exceeds the scale they are used to then they are just as inflexible, just as clumsy and just as incapable of solving the task by cooperating with others, and they cannot do it alone.

[Question] My question here was rather that I was trying to "make a point," that the large enterprises still dominate here while among the developed countries, in Japan and in the United States, one finds that much smaller

firms work and survive as participants or in engineering activity along with the big ones.

[Answer] This is an exciting thing, but I have a different opinion. In my opinion there are very few really large enterprises in electronics in Hungary. More precisely, we have no really large enterprises, we have medium enterprises. So we are lacking big ones and little ones. A number of small undertakings have developed in recent years, primarily in the area of software development, but the little ones are incapable of really serious technological developments, because this requires mobilizing very great research forces. They are building on clever ideas rather than on hard solutions with a future, solutions which might ensure being a leader somewhere. The big ones are not big enough to be able to concentrate the technological and systems R&D work necessary to reach the world level.

[Question] What are the further steps in working out the details of the concept?

[Answer] They are the following. In the 3 or 4 months ahead of us we must create harmony between the Seventh 5-Year Plan and the central program, so we have to "scale" the program, so that it will have a proper place in the national economic plan, the inter-branch programs have to be worked out, the details of the programs for the telephone network, education, research and the state administrative computer technology program. We have to agree on the concrete content of the programs of all the ministries and we must come to an agreement on those elements of economic regulation which will support this program.

A new, complex CEMA technical development and research program is being worked out too, up to the year 2000, and it will embrace the entire area of electronics, among other things. Our own internal work must be coordinated with that. The development of the medium-range research and development program which will start in the Seventh 5-Year Plan is still going on in Hungary too. Two significant elements of this will be the continuation of parts industry research and working out individual research programs belonging to the entire electronics problem. This means the concrete formulation of more than 100 projects.

[Question] How many people are working on this program?

[Answer] A very broad sphere is involved. There are few of us here in-house, and there are not too many in the state organizations either, but today nearly 150 experts are being used directly by the OMFB just on planning the research work, and in addition to these very many others are working in various areas. This sphere will not narrow, it will expand. This stage will last until about the end of the first quarter of next year, this will set up the relationship between the program and the Seventh 5-Year Plan. In the next stage, up to about September or October of next year, we must work out an entire detailed action program system in which the actions at the state level, the government measures and the actions of the ministries are coordinated. In addition to this, since it means money, I believe there will be very serious driving forces as well. One of the most important questions is the extent to which the

measures will be accompanied by a change in attitude, which is needed here. It may appear that in recent months the press, radio and television have been "preaching the word." I believe that this will be very important in the period ahead too, but it is just as important that the social organizations, the MTESZ [Federation of Technical and Scientific Associations], the KISZ, the trade unions, the Chamber of Commerce and the TIT [Society for the Propagation of Scientific Knowledge], support this program and publicize it. These organizations have developed their own programs, positions and educational forums. Indeed, even the political bodies have dealt with it. If the entire social environment relates well to the program then one can expect the decisions in concrete matters to speed up.

[Question] The leader of a large computer manufacturing enterprise has said about office automation that in many places it fails because they try to introduce the new technology under the same circumstances and especially with the same work organization. He noted concretely that in an electronic office one needs an entirely different work discipline, an entirely different division of labor and an entirely different way of doing work. Does the program deal with this too?

[Answer] This is part of it, and I can give examples of the concrete ideas. A decision about this has been made already at the concept level. A lot of social science research will have to be part of the research program, for example in connection with work organization, enterprise leadership and guidance methods, changing and modernizing the state administrative systems, in connection with the spread of electronics. Today these are still research themes, but I hope that they will bring concrete profit relatively soon. Research has started at the sociological level. First of all we would like to prevent those negative effects which might appear in the execution of a very intensive electronics program. I do not want to go so far as to say that a part of the labor force will become unsuitable for conducting the activity, but....

[Question] And maybe some of the leaders too?

[Answer] Them too, but ultimate problems may arise, that complex, well organized, electronic activity could be very dictatorial or could be very democratic. To do it well we must prepare for it. So we might be happier if the name of this program was a socio-economic program. But the government gave it the name of an economic organizational program, and this in itself is not a customary thing, and this is a very essential element.

[Question] There is one thing we have not talked about, so let me ask. By about what percentage might this program affect the national income, the national total product?

[Answer] One hundred. It might affect it 100 percent, because in my opinion there are very few activities which will not be affected, which have not been affected already, by the spread of electronics. Everyone uses the telephone, so everyone is affected by the program already. Television, radio and the media participate in social processes, and naturally these are already electronic. If we look at the more important strata of the work force then

automation is affecting manual labor everywhere, in industry, in the infrastructure and in agriculture--and I stress this, because agriculture may be the branch in which electronics is spreading most rapidly today.

[Question] Elsewhere too, or just here?

[Answer] In an interesting way, primarily here. There has been a real spread of electronics in agriculture in other countries too, but here agriculture is going electronic more quickly than industry.

[Question] This probably indicates that the driving force, the interest, is greater there....

[Answer] ...and it indicates a lot else besides. It indicates that the processes of agriculture are somewhat simpler, more easily surveyed, more easily reduced to algorithms than, for example, the processes of industry. In agriculture the cooperation links are less determining than in industry. The work has elements which can be taken care of simply with computer support more easily than in industry.

[Question] And there were greater opportunities for investment here than in industry?

[Answer] I don't think so.

[Question] Was there less inclination to accept peak technologies in industry, or was the situation just not ripe for it?

[Answer] Perhaps the biggest obstacle to the introduction of peak technologies today is that entirely different assets and labor costs or cost ratios have developed in Hungary than elsewhere. Economy in the case of peak technologies is substantially higher than, for example, in West Europe. If these ratios or value ratios could be changed--and there are concrete prescriptions pertaining to this in the program--then the spread would probably be substantially faster. For example, according to the discussions thus far we could establish preferences for the most modern technologies--for a while, until the readiness and capability in regard to domestic use are run up--which would put such aspirations in the foreground at the enterprises, in contrast to the traditional solutions.

[Question] In your opinion, if we evaluate the results of the program in 1990 will we be able to establish that our backwardness has decreased on the basis of an international comparison?

[Answer] Has our backwardness decreased, or will it decrease by 1990? I think not. It may be strange to say this when starting up a program. Our backwardness will be less that it would be without this program. This program will accelerate the process here at home, but in the next 5 years it cannot accelerate it as much as it is already accelerated in the leading countries.

[Question] So we are laying the foundations for the year 2000?

[Answer] It is not possible not to do so. The very fact that such a program will accelerate the process is positive. That it cannot accelerate it enough has, unfortunately, other reasons, which we all know from the situation of the economy.

[Question] You headed the work committee which developed the concept. How do you feel about its approval?

[Answer] The evening after the approval I figured how many more tasks we will have in the year ahead compared to the past 6 months. It will not be twice as many! It looks as if the several hundred experts we have mobilized will be very few to make this into a good program. But I was very happy that the government had accepted it, because I believe that the most important tool for making the economy dynamic has now been put forward as a program.

[Question] In the name of the readers of MAGYAR ELEKTRONIKA I thank you for the interview. We wish you further successful work in developing the program.

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ROLE OF COMPUTER ENGINEERING, AUTOMATION RESEARCH INSTITUTE

Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1985 pp 18-19

[Article by Istvan Eszes, business director: "The Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences"]

[Text] Our institute came into being in 1973 out of the Academy's Automation Research Institute and Computer Technology Center. The predecessors of these were Academy and university research groups which had been organized into institutes at the beginning of the 1960's. The SZTAKI [Computer Technology and Automation Research Institute] is the second largest research institute of the Academy and employs nearly 800 people. The research themes of the institute vary over a wide scale, in the areas of applied mathematics, computer science and technical science.

Applied research has an important role in addition to basic research, and our institute takes part in the introduction and sale of research results as well. About 200-300 domestic and foreign publications per year report on the results, and "working papers" are also published by the institute. The goal is research and development on integrated systems, creation of production and process control systems and the automation of design and manufacture.

In addition to carrying out scientific tasks the institute operates the central computers and computer network of the Hungarian Academy of Sciences, thus providing computer technology services to other Academy research institutes. A broad computer park is available to carry out these tasks. The central machines (IBM 3031, CDC 3300, R-35) can be accessed locally and through the network and in addition more than 20 minicomputers (PDP, TPA, MSZR) and various types of microcomputers are available to researchers.

Scientific Activity

The institute consists of seven scientific main departments: the Applied Mathematics Main Department, the Automation Main Department, the Process Control Main Department, the Machine Industry Automation Main Department, the Computer and Network Main Department, the Computer Science Main Department and the Electronics Main Department.

In addition to those listed above there are a few smaller scientific groups and the technical and economic units needed to support the activity of the institute.

A detailed listing of the research themes and the economic achievements introduced would far exceed the frameworks of this brief introduction, but the chief research areas are the following.

In the area of computer aided design and manufacture (CAD/CAM) we must mention primarily the research and development results on integrated flexible manufacturing systems. In the systems already in use (Csepel Works, SZIM [Machine Tool Industry Works], EVIG [United Electrical Machine Factory]) and in those to be introduced in the years ahead an important role is played, in addition to new system design achievements, by control equipment developed at the institute and by the research results we have achieved in the area of five dimensional controls and designing special, sculpted surfaces.

Computer graphics are indispensable tools for computerized technical design. Our institute developed and began to sell such devices as the first among the socialist countries. From the modular elements of the GD 80 vector graphic display family now being sold one can assemble a graphics terminal or an independent graphics microcomputer. The multiple picture screen sizes and color variations offer broad applications possibilities. The primary applications area for it is computer aided technical design, but in addition an important advertisement for it is the air traffic simulation training system which can be seen on the cover. The COBUS local network developed here at the institute and providing high speed data transmission ties together the graphic and alphanumeric displays. The graphic software packages developed here, such as the GKS in which there is great domestic and foreign interest, play a very important role in addition to the hardware elements.

Research on and realization of computer networks has traditionally occupied an important place among the institute's themes. The first computer network of the country (the MTA [Hungarian Academy of Sciences] network) was developed here 10 years ago. Our experts have achieved outstanding results in domestic R and D work and in preparing for the creation of international computer networks. In addition to the research results achieved in the areas of operating systems, distributed systems and graph theory, this work is distinguished by a series of equipment items and systems (network controls, network terminals, microcomputer families, the ESZR [Uniform Computer Technology System] TAF [remote data processing] processor, the homogeneous network based on the TPA 1140, etc.). With the aid of a computer net we have provided a switching possibility for large international online information databases.

The institute is interested primarily in development and delivery of complete systems, but since the necessary tools cannot be obtained in every case we develop and sell some of them ourselves. The microcomputers in series manufacture (the GD 80, SYSTER, VARYTER, PRIMO, etc.) will be followed shortly by 16 bit "SUPERMICRO" computers, local network interfaces and new elements of the GD family (a text and figure editing system and high resolution raster terminals).

The basic and applied research done in the areas of mathematical statistics, algebra and logic provide a scientific foundation for the creation of large information and database management systems. The research achievements have been embodied in such high quality devices as the SDLA system aiding computer logic design, the Genera program generator, metagenerator systems aiding automatic programming and program packages which can be used on personal computers. Outstanding among the applications is the complex enterprise information and guidance model system being prepared for the EMO [Elektromodul, Hungarian Electrotechnical Parts Trading Enterprise]. Systems and devices prepared by us already aid the information and data processing work of a dozen institutions and enterprises in addition to the Danube Iron Works, MEDICOR, the MTA, the Eastern Slovakian Iron Works and the Nadudvar KITE [Corn and Industrial Crop Production Cooperative] (see the details in a separate article).

In addition to high quality research (self-tuning control, modern hardware and control structure, modular real-time software) in the area of computerized process control the hardware and software developments ensure the creation of efficient applications systems. The MFB-Z80 microprocessor process control system developed at the institute has been in series manufacture for several years and there are a number of foreign applications in addition to the domestic power plants and factories. Among other things the multi-computer, high reliability nuclear power plant control system being prepared within the framework of the nuclear energetics cooperation of the socialist countries is being built on the basis of this. The goal of current device development is the creation of process control networks based on decentralized, intelligent elements.

Among the model applications systems we must mention the institute's participation in various systems for a Bulgarian ethylene pipeline, the TVK [Tisza Chemical Combine] and the DVK [expansion unknown], in the national gas network dispatcher system and in network systems for the Capital Gas Works and the Sewerage Works.

Management

The years since its founding have brought a number of important changes in the economic conditions determining the life of the institute. Under the economic conditions of that time it was natural that budgetary support made possible the larger scale basic research, thus giving a certain degree of independence from daily market competition. The changes which have taken place in the meantime have had the effect that while the size of the institute increased, with a constant increase in costs and thus in the need for the volume of income needed for the institute to survive and develop, the magnitude of state support has not changed, and its real value has significantly decreased. If we want to meet the expectations made of our institute and want to preserve the leading place we have occupied in technical life then we must manage more intensively than before with all the resources at our disposal.

This situation, forced upon us, also has the advantage that our research achievements clash with reality much more sharply within a shorter time, the natural selection takes place more quickly and on an increased scale, showing

which research results can be put into practice. Our institute has taken part in undertakings of various types for years--as the regulations made this possible. The work does not end with the conclusion of the research and development. We also undertake a role in the production and sale of the products. We have formed a number of research and development production associations in recent years. Our partners in these come from the areas of industry, agriculture and trade--depending on the tasks. For the most part these goal oriented undertakings work successfully in their areas. For example, through the MICROKEY association (our partners are the New Life agricultural cooperative in Sarisap and the Elektromodul Foreign Trade Enterprise) we are selling complete applications systems based on microcomputers. It might be mentioned as a matter of interest that this association manufactures and sells the first domestic home computer to be produced in relatively large numbers at an accessible price, the PRIMO. The ITEX Association is based on our laser technology and computer technology developments. Its purpose is research, development and production in the area of printing industry and editorial text processing systems and equipment. The institute recently created a technical development subsidiary enterprise called COSY (Cooperative Systems) the task of which is to research the possible market utility of intellectual products created at the SZTAKI, develop them into marketable products, and organize and manage manufacture, advertising and sales. This will relieve the institute of its present "split personality" in which it is sometimes very difficult to find a common denominator between long-range scientific research and short-range material interest. In addition to the forms of undertakings listed above the institute is building deliberately on internal undertakings (for example, the institute economic work association) and we are building up intensive contacts with a number of outside small undertakings and cooperatives.

In addition to scientific and economic activity the institute is placing very great emphasis on education, on training replacements. We have created opportunities for domestic and foreign scholarship work by our people and foreign guest researchers are always working in our institute.

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COMPUTER ENGINEERING DEVICES AT SZTAKI

Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1985 pp 20-21

[Article by Pal Verebely: "Our High Performance Computer Technology Devices." The article summarizes three research trends at the Electronics Main Department of the MTA SZTAKI (Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences)--the results achieved and the present developments in graphics, local data transmission nets and multi-microprocessor architecture.]

[Text] Since the beginning of the 1970's the MTA SZTAKI has been dealing with the development of high performance graphic display systems. In the course of this we first developed the GD71 using a minicomputer.

The GD80 is a vector drawing image refresh type display family. The two chief members of the family are the BT terminals, which are substantially more intelligent than the Tekronix 401 x type devices, but because of the image refresh the number of lines which can be drawn is limited, so it is useful to use a picture screen with a long after-illumination. The terminal can be accessed from the operating systems (UNIX, RSX) of the PDP11 (CM4) type computers, but in certain special purpose systems it can play an independent role as well (for example, air traffic control). The autonomous systems (AGS, SGS) have a built-in 16 bit minicomputer, background storage and floating point transformation hardware. They are primarily suitable for special purpose systems because of their memory and disk size. Without exception today the large western general purpose CAD systems run on 32 bit minicomputers with 100 M byte or larger disks. So as we see it the terminal is best suited to the market demands and there will be a need for relatively fewer autonomous systems. The latter can be used here at home primarily as turnkey "drafting systems" or for "finite element pre- and post-processor" purposes. One can also expect machining and architectural applications abroad, primarily in the GDR.

A special application of the GD80, developed jointly with the LRI [Air Traffic and Airport Authority], is the radar simulation training system installed at Ferihegy Airport to train air traffic controllers. This system contains nine GD80 configurations which are linked to one another with the aid of a COBUS high speed local network. Four monochrome and one color large picture screen displays serve to present the simulated air situations; two GD80 DP

"computers" without screens provide the simulation and prepare the new "air traffic game" (a maximum of 64 aircraft in an airspace of 600 x 600 x 20 kilometers); two GD80 KC units serve as concentrators for pilot stations made up of VDT type alphanumeric displays. The system is redundant, contains at least two of every element type, and so remains operational even with the failure of one element. Additional sales of the simulation training system are expected, primarily in socialist countries.

On the basis of the applications experiences with the GD80 and the trends which can be found in the world there is heavy pressure on us to deliver in large series the simple, line drawing display emulator, cheap but high resolution raster (black and white, one bit/pixel type) equipment. This is why we developed the equipment called the GD85 TEKEMU, which is compatible with Tektronix 4014 (1024 x 768 visible pixels, on a 19 inch screen). The TEKEMU can be connected as a standard asynchronous (RS232-C) terminal to a host computer (we must think here primarily of the MSZR PDP11 compatible minicomputers widespread on the domestic and CEMA markets, for which finished applications systems can be obtained).

The GD85 TEXPRO is a text and figure editing terminal requiring the arranged A4 format which contains a 16 bit terminal processor. The resolution of the graphic part is 1024 x 800, that of the independent character overlay is 64 lines with 96 characters per line (in the case of a screen filled with 8 x 16 raster point characters). It connects via a fast channel (for example, parallel interface or local network) to a central computer with large background storage (for example, a TPA 1148, 440 or R11 megamini). Its large internal memory makes possible local storage, correction and display of several tens of written pages, including text and graphic display. The equipment is intended primarily for press, editorial and other demanding text and figure editing tasks.

The TEKEMU and TEXPRO configurations, which take over the GD80 peripheral and card assortment, may be mass produced beginning in 1985 within the frameworks of a SZTAKI and HTSZ [Communications Technology Cooperative] cooperation.

Among the raster display equipment, we would like to start manufacture of the GKS terminal in the plan period. This is based on the common VESTA card system of the SZTAKI and the COSY SUPERMICRO architecture (double Europa cards, VME bus, multiprocessor possibilities). The GKS terminal has a resolution of 1024 x 1024 and can display monochrome or multi-color images; of these 600 x 800 pixels can be displayed with a domestic monitor or 1024 x 1024 with an imported one. The GKS terminal is compatible with international standards and realizes a large part of the GKS program package in the terminal itself; the remaining part runs on the host computer (under RSX11 or UNIX).

In the area of basic graphics software, in addition to the original GD80-GSS80 (AGS and TPA1140 versions are in use), the GKS program package is available for TPA 11, CM52 and VT32 machines and is suitable for driving simple terminals (the TEKEMU or 4014, GD80 BT, VDT52121, etc.). A version running under UNIX has been prepared; the RSX 11 version can be expected by the beginning of 1985. The GKS implementation of the SZTAKI has had a significant foreign response; it may be useful to execute other installations for micros

(for example, the IBM-PC under UNIX) and megaminis (the VAX-VMS). The IBM/ESZR environment merits special attention, because only these machines appear on the CEMA market today as a viable alternative to the VAX type 32 bit megaminis.

In addition to installing the present version of GKS on other machines it would be useful to develop software elements driving more extensive physical output devices (a device driver).

We must follow the further development of the GKS within the framework of the ISO and we must react quickly to steps taken there. The first of these is development of a three dimensional version, which has now entered the final definition phase.

In addition to graphic displays and the basic software involved our strategy must extend to other interactive graphic peripherals. In connection with the development of the GD80 family we had to develop very many types of peripherals (alphanumeric-functional keyboard, stick controls, positioning sphere, light pen, potentiometers, voice adapter, tablet)--we had to do so in the absence of an OEM market. Some of these live on in the GD85 TEKEMU equipment, but at the same time, for technical and ergonomic reasons, we must go forward to the development of more modern versions of these devices. In part this means redesigning the electrical construction of the peripherals (serial interface, building single chip microcomputers into the peripherals) and in part it means narrowing the assortment--keyboard, mouse and tablet. Other simple graphic systems will need the latter two as peripherals, OEM style, so we can imagine a greater production volume than for the displays.

We began development of local data transmission networks in 1978 within the framework of the GD80 project. The COBUS technology came into being as a result of this; it is of the CSMA/CD type, has bus architecture and makes possible the interconnection of a maximum of 255 stations within a distance of 1,000 meters. Basically COBUS links machines having UNIBUS (the TPA11 and GD80 families). A network control processor (front-end processor) based on an 8 bit microcomputer in each machine establishes the link with COBUS. We extended this technique to the COSY SUPERMICRO architecture too, where the VME bus represents the internal bus system. With the aid of the network control processor of the SUPERMICRO we created an independent COBUS interface (LANPBOX or KOBOZ); these terminals for end equipment (personal and minicomputers) have standard interface surfaces (2 or 10 serial asynchronous RS232-C compatible and one or two bidirectional 8 bit parallel interfaces), making possible a direct connection toward the coaxial cable on the side of the local data transmission network.

The LANPBOX/KOBOZ basic software makes possible the formation of a terminal network independent of manufacturer and of a carrier type network made up of various types of personal computers and service stations (background storage, printer, message mediator, etc.).

In the development of multiprocessor systems at the MTA SZTAKI we have introduced the VESTA card system based on the VME bus; we call such systems COSY SUPERMICRO. The systems which have been developed or which are under

development are made on the VME standard, in the 220 x 223.4 mm size. The element assortment is mechanically and electrically uniform, and ensures the assembly of microcomputers which can be expanded without limit at the modular level. The asynchronous bus system used accepts 8, 16 or 32 bit microcomputer elements, the address range being 24 bits. Interconnecting elements and data domain elements of various speeds can be done without difficulty. The back panel contains local Z80 buses for the intelligent Z80 based peripheral controls. The peripherals are connected to the cards at the cap connectors.

The VESTA card system is suitable for assembly of professional personal computers, black and white or color graphic terminals, single and multi-user, multiprocessor microcomputers, etc. which can be used in a broad range. All these devices can be interconnected through a local data transmission network or can be organized into an efficiency system.

The software and development environment for the COSY SUPERMICRO is UNIX, or the version of it rewritten at the SZTAKI (HUNIX). In addition to the various utility programs, the framework translating (assembler and C) and editing programs of the targeted processor types (Z80, Z8000, 8086, 68000/68010) run under this.

The MTA SZTAKI wants to form a COSY-VME Club, which would provide a common interest system for the members who could thus make the realization of their applications tasks more economical and faster by reducing the human labor expenditures. The jointly developed microcomputer elements (cards, peripherals, mechanics, software) would be modular and would constitute a system which easily accepts unique developments. Another goal of the COSY-VME Club would be creation of a domestic OEM card market.

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HUNGARY

PRESENT, PROSPECTS OF COMPUTER CONTROLLED MANUFACTURING CELLS

Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1985 pp 42-47

[Article by Jozsef Hatvany, Matyas Horvath and Janos Somlo: "Computer Controlled Manufacturing Cells--Achievements, Possibilities, Prospects"]

[Text] It counts as a commonplace that the most comprehensive trend in the development of machine manufacturing technology is flexible automation. Flexible manufacturing systems, which are such characteristic tools for the economical automation of small and medium series manufacture in the machine industry, can look back on a past of about 15 years. Of more recent origin is the spread of automation to designing, process control and quality control, the distribution of the ever increasing intelligence of the systems among system components, and system structure based on manufacturing cells. Manufacture without supervision is becoming ever more realistic, even a widely used practice, that is, the operation of the equipment with reduced personnel or without personnel in second and third shifts, and even during breaks and on holidays. The manufacturing cells are being integrated into automated shops, and even automated factories are in operation.

Integrated material and data processing systems developed in this way flexibly follow changes in products, reduce throughput times and semifinished inventory, stabilize quality, provide a way around manpower shortage problems and with full exploitation of the useful time base of the tools they are drastically reducing specific investment needs and production costs.

The question frequently arises as to what all this has to do with domestic research and development and the domestic machine industry.

Automatic manufacture without supervision might be compared to an iceberg, the essential part of which is not the tip visible above the surface but rather the mass below the surface. The achievements of scientific areas extending from research on manufacturing processes to the development of methods for artificial intelligence are creating the possibility that machine industry manufacture will take place in second and third shifts without humans or with very little supervision.

For a moderately developed (?) little country like Hungary it seems a very tempting possibility to catch up to the achievements of the most developed

industrial nations and the leading enterprises by buying the tip of the iceberg. But this is not a real possibility; lacking a domestic research and development background creating receptivity can cause problems of such magnitude as to drastically reduce the efficiency of the technology purchased. There is a great danger that the tip of the iceberg will become an iceberg itself, with negligibly tiny tip.

So it is important from the viewpoint of Hungarian industry as user that there be domestic development. The Hungarian machine tool industry and electronics and computer technology industry are also interested as manufacturers in both domestic and foreign markets. And if we consider that our industry is excluded from the most recent foreign technological achievements for political (embargo) or economic reasons (the monopoly of the firms, foreign exchange) then it is obvious that domestic CAD/CAM development is a condition of key importance for the development of our industry, of our machine industry.

Manufacturing Cell, Manufacturing System, Shop

The manufacturing cell is the smallest independent unit of an integrated material and data processing system. The interpretation of the concept is not uniform. Many equate it to a manufacturing system while others mean by it one work station (machine and robot or pallet changer and buffer storage). We stand closer to the second interpretation; what we call a cell is a combination consisting of one or at most a few machine tools, a buffer storage and local material moving equipment.

The tasks of the manufacturing cell, among the conditions for unsupervised manufacture, are:

--processing the workpieces,
--local material movement (tool, device, workpiece, measuring instrument),
--automatic supervision of the manufacturing process,
--quality control,
--dispatching.

The cell must have a direct connection with the higher levels of

--production control,
--process planning,
--quality control, and
--material movement.

If we accept this roughly outlined interpretation of a cell and presume that manufacture is automated at the shop level, then we get a five level guidance system: factory-shop-virtual system-cell-machine (Figure 1).

The task of factory level guidance is designing products and manufacturing tools, planning the process (including selecting the shops), keeping track of inventory and costs, taking care of orders and longer range production planning.

Shop guidance selects the manufacturing sequence best suiting the momentary production situation; that is, it allocates the resources (cells and their work stations, materials, tools, devices, warehouse space, etc.) to the workpieces to be manufactured or to homogeneous groups of them. This can involve production guidance tasks in that shop guidance creates virtual manufacturing systems, out of its own resources, for the various tasks, supervises the work of the manufacturing systems which are dynamically changing and partially overlap, carries out the fine programming tasks and resolves conflict situations among manufacturing systems in accordance with the priorities of the workpieces. Shop guidance also carries out dispatcher tasks pertaining to the warehouse, material movement at the shop level and measuring machines which are used jointly.

The virtual manufacturing system and the guidance of it are not realized physically; that is, it cannot be identified as a fixed collection of resources (cells, work stations), but rather only as a dynamically changing combination of separate computer and guidance functions, data and cells. Its basic function is to manage the batch for which shop guidance has created it. It performs this scheduling and dispatcher task in close cooperation with shop guidance.

In addition to coordinating the work of the equipment it is the task of cell control to solve the more complex problems of process control and quality control and provide partial redesign of the manufacturing process.

The control of the equipment (machine tool, robot, robot car, coordinate and measuring machine, etc.) must be suitable for carrying out the quality control and process control functions and providing the more simple realtime process planning functions as well.

Intelligence of the System

The most spectacular and most important characteristic of the development of control techniques is the distribution of intelligence, the development of local intelligence. We must, of course, regard the manufacturing cell as intelligent too, it consists of intelligent equipment. The intelligence of the cell and of the cell components has varying necessary (and possible) levels depending on the circumstances.

At the lowest level of intelligence the cell is capable of simple reactions. We can treat the replacement of broken tools, compensation for the effect of worn tools, stopping the equipment in a dangerous situation, etc. as such reactions.

Determining the computerized design tasks (paths and movement conditions) and solving simple parametric optimization tasks represent the second class of intelligence.

The ability to adjust to economic conditions and technical circumstances can be regarded as the third intelligence level, that is, optimizing adaptive control, more demanding automatic process control and quality control and the simpler learning ability.

And, finally, the highest level of intelligence is represented by a cell with high level planning, learning, structural optimizing and self-organizing ability.

The intelligence can be distributed in various ways between cell control and the control units of the equipment. There is no doubt, however, that the third and fourth levels presume the use of machine intelligence, expert and reasoning systems and a higher level knowledge base (involving active and meta-awareness) going beyond facts and data.

We selected as a goal the development of a cell satisfying the requirements of the third intelligence level, and we selected as the first applications area the manufacture of cabinet type, mass workpieces.

Machine Tool

The machine tool must be capable of processing the workpiece from five sides at one grasp and must be capable of working inclined planes, optional direction holes and complex surfaces. The automatic quality control must extend to correction of size, form and situation errors and controlling the surface roughness.

On the basis of an analysis of flow technique surfaces, forming tools, dies, etc. we established that the class of "complex" surfaces is made up most often of line surfaces or translation surfaces and not analytical (sculpted) surfaces, and this class can be manufactured most productively with cutting with five axis working. Taking into consideration the drilling and more simple plane cutting tasks as well we also established that the machine must have a working center.

A five axis working center, as can be seen in Figure 2, corresponds best to our goals. The workpiece makes both rotation movements on this. Of equal value to this might be a machine design in which the tool makes one of the rotation movements, but the experimental equipment could be produced more easily according to the first morphological design.

The primary advantage of the machine is that it makes possible an extraordinarily high operation concentration, since every surface on five sides of the part can be worked in one grasp. Thus, compared to a simple three axis machine tool, several dozen grippings can be combined and many devices can be spared.

The five axis design offers a possibility for compensating for spatial position errors and with other conditions identical this increases the precision of the working.

Automatic detection of tool breakage and exchange of broken tools, sensing, diagnosis and elimination of vibrations, noise and acoustical emission control and sensing of temperature and correction of its effects at critical points must be solved in the machine tool.

The machine is supplemented with a pallet exchanger, but the methods of robot parts handling for cabinet and bulk parts must be studied and developed.

Control

The cell control takes care of dispatcher and report preparation tasks, maintains contact with the higher levels of control, stores the current programs and takes care of the more complex optimization, adaptive control, quality control and supervisory functions. An expert system aids the carrying out of the two latter tasks.

At the basic level the control of the working center executes elementary movement instructions and performs realtime transformation and tool size correction calculations. At a higher level it can also generate tool paths, but it has simple adaptive and quasiadaptive capabilities and receives and processes quality control and process control information from both sensors and the cell control. It has simple learning properties.

Because of the realtime calculations the computing unit of the machine control should be fast, should have fast data input possibilities in the event of very long programs and should be connectible with the NC programming computer.

Figure 3 shows a simple block diagram of the machine control. In the system depicted we mean by cell functions the coordination of production guidance and working factors (secondary optimization), providing mathematical models of possible optimizing adaptive guidance, and processing the quasiadaptive correction signals. The task of the NC control of the machine tool might also be planning the tool paths. Naturally the separation of the several functions is conditional, just as the cell control and machine control might be a single physical unit. Modern control (CNC) equipment is increasingly suitable not only for higher level execution of the control tasks (moving, manipulating) of mechanical and other tools but also for performing the above mentioned, increasingly complex planning and guidance functions. The next steps will be building in production control links and ever higher level optimizing, adaptive, learning options and combinations. As an example we show the structure of a modern, multi-microprocessor CNC device.

In systems with such structure each processor is an independent, specialized computing unit with its own local bus to which its own resources (I/O and local memory) are connected. All the processors are connected to the system bus, to which the common resources (I/O and system memory) are connected. The parts of the several processors are the following: a microprocessor with its own logic which decides about connection to the local or system bus and dual access memories, which can be accessed locally or can be accessed by other processors via the system bus.

The individual processors carry out technological processing, path control, servo, interface, man-machine link, etc. tasks.

Such a structure makes possible, by means of software, the realization of a previously undefined hierarchical structure and thus the solution of the most varied tasks.

In addition to the traditional NC control tasks a system with such a structure can naturally carry out the tasks of cell control. Hardware and software options are provided for the solution of various tasks. For example, according to intelligence levels: an option realizing simple measurement-sensing-accepting interventions at the lowest level; or a graphic display and design system with medium resolution (for example, 9 inch, 736 x 576 pixel) in the second class of intelligence.

The solution of these tasks is already a current practice. Realizing further levels of intelligence is a timely task for research and development, and construction of the tools and system described would provide a realistic framework for this.

Programming

In addition to the well known functions of NC programming (including planning the three, four and five axis working of complex surfaces) unsupervised manufacture makes necessary the programming of quality control and supervisory functions. This means providing the normal (reference) values of process, workpiece and tool characteristics, the permitted deviations of quality and process characteristics, the direction of expected changes, the frequency of measurements and interventions, input of a priori information for cause-effect interdependences, etc.

Two interface surfaces between programming and control are possible. It is necessary to provide the base level, that is the elementary movement and correction vectors, identifiable with the ISO NC instruction system; and it is useful to have an interface at the operation element level too--if the control makes this possible. In such cases, in addition to defining the surface to be worked (drill, plane, patch) and the tolerances, we prescribe the method of working in that the control elucidates the movement paths and generates the elementary movement vectors.

Results

Development of an unsupervised manufacturing cell is in an advanced stage. An experimental machine is in operation; indeed, the first four and five axis working centers have been set up in the Esztergom Cutting Machine Factory of the SZIM [Machine Tool Industry Works]. The VILATI [Electric Automation Institute] has manufactured the first series of the new controls. The cells can be programmed with the FFS or FAUN system.

As a result of Academy, university and industry research and development cooperation we have succeeded in breaking through a strict embargo restriction and thus breaking through a technological level.

Adapting a manufacturing cell to a broader environment has become timely; the elements of this environment are for the most part given as a result of earlier research and development work. This environment can be characterized by an increase in the scale of integration and by the automation level of more and more functions.

At present there is no possibility in our homeland of integrating into the described multi-microprocessor CNC equipment those computerized planning adaptive control and other results achieved.

At the Machine Manufacturing Technology Faculty of the BME [Budapest Technical University] they have developed a microcomputer designing system which works on-line with a domestically developed DIALOG CNC.

Modern strategic principles have been worked out in our homeland in one of the most important areas for solving human-independence, which is adaptive control. This has made possible the realization of experimental optimizing adaptive control equipment and, on the basis of this, the development of a DIALOG CNC AC option with a similar purpose.

Integration of Process Planning and Production Guidance

Development of the cell cannot be successful if we do not take into consideration the greater scale or higher levels of integration and automation. Higher level systems analysis and design are needed to determine the functions and interface surfaces of components and subsystems as properties of future cooperative systems. Only in this way can we realize the later relationship of them to one another and their harmonic cooperation.

Especially interesting are an analysis of the relationship between process planning and production guidance, and the contacts between their own levels, a study of the possibilities of multilevel optimization, and the use of common databases.

Through the interface surface between process planning and production guidance we might pass on to manufacturing the desires and prescriptions of the leadership in regard to economic goals (cost, productivity, profit, etc.). This recognition led to the method of higher level or so-called secondary optimization, the essence of which is a complex general guidance strategy, so that, instead of the stability of the system demanded earlier, we must formulate as the goal to be followed, and as the fundamental condition for survival, swift, adaptive accommodation to constantly changing needs and environmental conditions. The optimum criteria constantly change too because of marketing conditions and the necessary disturbances. Where must the part or subassembly be produced quickly, where cheaply, and when for the warehouse, with the greatest profit. The deficit tool must be done without, we must schedule production, wear and replacement of tools, etc. The CNC controlled manufacturing cell is capable of reacting immediately to direct orders by changing the work point, that is with parametric optimization, especially if it has an optimizing adaptive control capability. Interpreting adaptability more generally, a solution of structural optimization is both necessary and possible, by selecting the procedures, manufacturing systems, machines and manufacturing sequence, by modifying the scale of the operations, etc. An experimental application of the principle and the method has been realized already.

Research, Development Goals

The possibility of unsupervised automatic manufacture is based on modern NC techniques. Automation is increasing to an extraordinary degree in both breadth and depth. By breadth we mean the manifold and interdependent tasks of production guidance, manufacturing planning and production process control. By depth we mean the increase in the degree of human-independence and in the level of intelligence associated with this.

As we mentioned, there is a mass under the tip of the iceberg, the mass of true interdisciplinary and tasks necessary for the flexible automation of manufacture, and without the creative solution of these tasks further progress is not possible.

The few achievements listed in the preceding point are limited to cells without direct supervision. Behind these stand achievements in the areas of systems technique, computerized (automated) engineering design and process control.

We cannot turn to an even outline description of the above achievements and future goals, because of their great extent, but in accordance with the profile of this journal let us try to give some idea of how the use of modern electronic devices motivates, provides a foundation for and pervades the development of this area.

Problems at every level of computer technology (mainframe, mini and micro) have been solved; the tasks in this area have a direct effect on solving the cell level task as well. Still, at present and in the near future, the crucial factor appears to be the tasks to be solved in linking into a network and providing an environment for broad use of high performance multi-microprocessors and ever more intelligent designing and control equipment.

A system developed in this way, for example the one depicted in Figure 4, is suitable for solving every task touched on thus far. It has the components, already considered classic, serving to realize machine and transport manipulation and control with great precision and it has the computer graphics components serving to solve the man-machine link, program management and elementary planning tasks.

The path of development is the integration of an ever broader sphere of operations planning tasks, including definition of technological data with an appropriate databank background. Options containing amplifiers and transformers will receive signals from sensors and diagnostic, monitoring, adaptive control and learning options will process their information.

Solving the tasks will take place in a coordinated way, taking into consideration in a far-reaching way the production guidance, planning and momentary process control situation. The coordinating computer part of the system will take care of this.

A task of extraordinary significance is a domestic solution providing modern guidance tools, because only this can be a basis for moving to higher levels

of development, for which a number of results capable of integration are available.

Social Aspects

The comprehensive automation of manufacture poses a number of problems and tasks in the areas of system design, implementation, application and expansion and of education and further training.

Designing systems require multi-disciplinary information, team work and comfortable and efficient consultation channels. Never did a leading designer need such comprehensive information (machine manufacturing technology, mechanical design, computer software and hardware, guidance technique and electronics, sociotechniques, marketing, investment policy, etc.).

Never has the rigid, hierarchical leadership and organizational style so confused the work of the groups recruited from various professions. Experimental training started in the fall of 1984 at the Mechanical Engineering School of the Budapest Technical University to overcome these problems.

We must use new project control methods (for example, matrix management), we must modernize the information of higher and middle level leadership and machine workers in the interest of the necessary consensus. The user must be brought into the design of the manufacturing system.

It is our profound conviction that the systems must be capable of expansion and improvement, must be able to adapt to the ideologies and conventions of various users.

Prospects for Applications

The first domestic manufacturing cells are in operation already. The first cell structure systems are being designed. The first orders have come in, the needs of domestic industry have been formulated. Our socialist and capitalist partners are asking for bids on such systems.

Flexible automation with little supervision means an epochal renewal of the machine industry. It is our conviction that the domestic machine industry will not stay out of this change of epoch process.

Biographical Data:

Matyas Horvath

I earned a mechanical engineering degree, with honors, at the Bauman Technical University in Moscow in 1959, and in 1966 I earned a candidate's degree in the area of adaptive control of machine tools. Earlier I was research engineer and then department chief at the Machine Industry Technological Institute. Since 1970 I have been working in the Machine Manufacture Technology Faculty of the BME. I have been chief of the faculty since 1975. My chief research areas are development, automation and computer aided design of manufacturing processes,

optimization and adaptive control of metal cutting work, programming NC machine tools, and sequence and operation planning of automated manufacture. I have worked out a method for process design using the generative and semi-generative principle. I participated in the development of the FORTAP system, in adaptation of the APT and EXAPT system family and in development of a uniform NC programming and AMT system for the CEMA countries. I have served as chairman or vice chairman in a number of domestic and foreign associations. I am married and have a daughter at the university. In my free time I like to play the violin and a favorite pastime is collecting books dealing with 20th century European history.

Jozsef Hatvany

I completed my studies in England, returned to Hungary in 1947. I wrote my candidate's thesis in the area of computer technology operations execution. I used the results of this in my patents in the area of machine tool control and computer graphics. I am a scientific consultant to the Computer Technology and Automation Research Institute of the MTA, a member of the presidium of the MATE [Measurement Technique and Automation Scientific Association], a member of the editorial committee of several international journals and holder of a state prize.

Janos Somlo

I am chief of the automation main department of the MTA SZTAKI. My chief professional areas are computerized methods of control theory, machine industry automation and computerized design. I graduated with honors from the Bauman Technical University in Moscow in 1960. Following this I worked in a machine factory where I dealt with technological research and the design of special machines and products. Since 1963, at my present place of work, I have been doing research in the areas of the theory of non-linear systems, design of control system computers and machine industry automation problems. My works appearing in Hungarian and foreign languages number about 60. I defended my candidate's dissertation in 1967. In 1968-1969 I spent one year in the United States on a Ford scholarship. I undertook a role in national coordination of the activity of the AMT. I have a son at the university who would like to be an engineer. Tennis and skiing are my favorite pastimes.

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OFFICIALS OF MOM, TECHNOVA QUIZZED

Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1985 pp 90-91

[Unsigned column: "We Have Only One Question...."]

[Text] Question To Gyorgy Magyar, Chief of the Developmental Main Department of the MOM [Hungarian Optical Works]

[Question] Knowing the domestic difficulties of development and manufacture, more and more people are asking, a bit wonderingly: If the time factor is so important in electronics, then why are not the manufacturers trying to develop more efficient, broader international cooperation, to create mixed enterprises?

[Answer] In order to create a mixed enterprise one must first find a suitable partner. While cooperation with the socialist partners is organized bilaterally and multilaterally with the aid of CEMA and ministerial work groups, the capitalist contacts come into being in a rather spontaneous way, I might say by chance, chiefly by means of some personal acquaintance. So there is not much choice in regard to partners, we try to latch on to every opportunity which offers itself, and this naturally means also that our calculations do not always pay off. I think that the creation of contacts could be made more systematic through the chambers of commerce organizations.

In any case, an industrial enterprise with export rights has a much greater opportunity to make more direct contact with the customer market, expand the sphere which can be considered, and seek out those gaps where we might be received as a partner due to our technological conditions and intellectual preparedness.

I think the best path to follow would be if we developed the existing cooperation contacts into mixed enterprises. Certainly the cooperation partner has the information needed to expand the circle of customers, he has already worked himself into the given market, has constant contact with the users and knows what is necessary for development. This feedback is especially important in the case of computer technology, for example, when it is not known if the product delivered will fit into or function reliably in the system.

I could imagine a mixed enterprise as a smaller common subsidiary of two larger enterprises.

A multiple profile is characteristic of the large enterprises of the Hungarian electronics industry. When founding a subsidiary we should not think that it will copy in miniature the many profiles of the parent enterprise; a joint subsidiary should be founded only for one definite profile, and as long as this works it should operate, and when it runs out, change the profile. It is well known that the high level of domestic electronic parts prices is the chief obstacle to our being competitive on the capitalist market in equipment prices. If the product of the mixed enterprise were electronic equipment then it would be good to provide the electronic elements from the cheap capitalist relationship; in this way the product which the mixed enterprise could put out at less cost might be sold more advantageously even on the domestic market; and if in addition we are talking about a product which could be obtained only from the capitalist relationship otherwise then the undertaking would be beneficial even at the national economic level--as "semi-import." I believe that the basic condition is that the overhead of a joint enterprise managed as a subsidiary should be handled separately from that of the parent enterprise. The high overhead of the large enterprise would overwhelm any mixed enterprise created.

I do not think that the mixed enterprise would have to be concerned with really large volume production activity. The key question is fast developmental activity based on market research, which must concentrate on the suitable assembly of part units and complementary elements. The components should be obtained from the parent enterprises and the parts which can be obtained commercially should be obtained from stockpiling enterprises, choosing the more advantageous relationship. The assembly could be done on the premises of the parent enterprises, perhaps dividing it up. Service and customer service should definitely be part of the activity of a mixed enterprise.

In the case of an electronic device--which requires electronic and mechanical design work, is made of electronic and mechanical parts, and involves the testing and assembly of these elements and checking out the device--the Hungarian subsidiary might undertake all the designing and manufacture and assembly of the mechanical parts, but it should seek a partner for the electronic elements and the testing of them as long as the domestic electronic parts manufacturing background has not developed within the framework of the central development program.

It is an important question that there not be superfluous administrative, financial, duty and foreign exchange accounting restrictions in the path of creating a mixed enterprise, that there be a banking system which will help the undertaking and manage the money funds with a flexible attitude. If the mixed enterprise is advantageous to the national economy then the regrouping of capital should not be interfered with, it should be facilitated. For example, if tax concessions aid the investment at the partner capitalist enterprise then the domestic organs should ensure, as a minimum, exemption from the property tax obligation and the greatest concession when establishing the accumulation tax, in regard to the funds transferred.

In regard to partners in socialist countries, putting the cooperation contacts on a contractual basis might be the first step which could lead, after an intermediate division of markets and manufactures certainly, to deepening the cooperation and to the creation of mixed enterprises as well. At present this process is restrained by the existing differences in the economic guidance systems of the socialist countries, or in the direct or indirect nature of and degree of interest.

Question to Janos Bolyky, Deputy Director of the TECHNOVA Industrial Innovation Fund

[Question] According to our information the idea propagated by Gyorgy Marosan Jr for the creation of a "Hungarian Silicon Valley" has been embraced by the TECHNOVA Industrial Innovation Fund. Where do you stand now, and what plans do you have?

[Answer] Many may have ambivalent feelings in connection with the expression "Hungarian Silicon Valley." A "silicon valley" presumes the combined existence of technical, economic and other conditions which go far beyond our internal conditions and the possibilities of TECHNOVA--as a financial institution specialized to finance technical developments. At the same time we are finding that small organizations working in various areas of technical development--at present primarily managing organizations or organizations without independent legal status--can provide a basis for operation as undertakings in many cases, and certainly these can be significantly aided by a site with the appropriate general and technical infrastructure. Starting from this recognition TECHNOVA is striving to set up such "innovative sites." The innovation sites imagined by us will not specialize exclusively on electronic technical developments but rather will provide room for all viable technical development activity falling in the interest sphere of TECHNOVA or for services connected with this. Beginning in August 1984--as an experiment--on the basis of our agreement with the National Special Industry Enterprise we have been operating the first such innovation site. As owner of the site ORSZAK [the National Special Industry Enterprise] has signed a lease contract with the leasing entrepreneur here. TECHNOVA has undertaken the organization, ensuring utilization of the site and creation of the several services, in return for a percentage. In return for a lease fee fixed in the contracts the lessees receive the most basic services--such as water, electricity, guards, trusteeship, cleaning, dining opportunities and telephone--and in addition, according to our plans, they can make use of Telex, copying machines, legal services, conference room, a patent business and description office and certain computer services, in return for compensation. Thus far two small cooperatives, one special group, two economic work associations and one legal consulting work association have signed lease contracts on the basis of a document designating TECHNOVA. We also signed a financing contract with the entrepreneurs, and talks are now taking place with the others. We think that it is no small advantage if TECHNOVA undertakes to cooperate in providing the conditions for operation, in addition to financing. The experiences thus far are unambiguously favorable for all participants, so we trust that we will have the opportunity to set up innovation sites working on the basis of uniform principles in a few provincial centers with the appropriate scientific-industrial background, after having done so in the capital. We are

preparing to open a larger site in Budapest in 1985, and we are holding talks about this in several provincial cities. Our longer range goal is to put this resource system into the service of research and development. Our key word is business, we select our clients on this basis, and we would like it if healthy business contacts developed among the lessees too. In addition it really is true that the majority of the present lessees and the many possible ones applying are interested in electronics, which can probably be attributed to the greater innovative preparedness in this area.

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PROFILE OF PHYSICS RESEARCH INSTITUTE PRESENTED

Organizational Breakdown

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article by Ferenc Szabo: "Greetings to the Reader"]

[Text] Only half an hour from the noisy, multilingual, teeming multitudes of the inner city, at Csilleberc, the quiet of the mountains of Buda surrounds the Central Physics Research Institute of the Hungarian Academy of Sciences. One certainly does not think, seeing the various buildings under the trees of the forest that this institution, commonly nicknamed the KFKI, is the largest institution in the country.

The KFKI was formed in July 1950. Over the last three decades it has developed from a modest laboratory in which cosmic radiation was studied to a research center engaged in the study of almost every aspect of physics on an international level.

The KFKI name is more traditional than correct because it represents five scientific research institutes and a central technical area along with the necessary service units. The activity of the KFKI comprises basic research, applied research and technical development, all on the "KFKI level." The strength of this research center is in the opportunity it affords workers in many different fields to work in close contact.

The most important activity of the Particle and Nuclear Physics Research Institute (RMKI) is basic research, which in the past few years has been expanded by the addition of some new, fast-developing fields. Presently research is conducted in the following major areas: particle physics, applied nuclear physics (materials science, biophysics), cosmic physics, space research and processes taking place in tokamak units (fusion research).

With few exceptions, in each of the above areas both experimental and theoretical work is carried out. Experiments that need large installations (for example, large accelerators) are performed with wide-scale international cooperation.

The Solid State Physics Research Institute (SZFKI) does mostly basic research but it has newly initiated significant experimental and development projects

in optics and in solid state physics. Its present areas of research are lasers, spectroscopy, the physics of metals, partially ordered condensed matter and theoretical solid state physics.

The Microelectronics Research Institute (MKI) was founded in 1981 as a necessary consequence of the explosive growth of microelectronics. In its research activity goal-oriented research is dominant, although basic research is also necessary for the development of modern technologies. Its three main lines of research are magnetic bubble storage systems, semiconductor technology and tools, computer-aided design of circuits and the preparation of masks.

The Atomic Energy Research Institute (AEKI) is the home of research work conducted with a background of more than two decades of reactor physics and technology and of atomic energy. The institute has been and will be the necessary support for the safe and effective operation of the atomic power stations in our country. Presently significant research and development is conducted in the following areas: reactor physics, reactor diagnostics, thermohydraulics, computerized reactor operation, radiation protection and dosimetry. In these areas the AEKI plays a leading role both in Hungary and among the Socialist countries.

The Research Institute for Measurement and Computer Technology (MSZKI) is the largest and perhaps the best known. In its activity applications necessarily dominate as concerns both hardware and software. The main directions of application are those in industry, laboratories and business. A further task of the MSZKI is the furnishing of small computers to the entire research center. These machines increase the efficiency of the large KFKI computer and also provide suitable computer support for the various research programs because they are operated either as independent units or as part of a network.

The Technical Directorate (MSZI) is the centralized technical basis of the research center. Its task is the development and production of individual machine systems and electronic instruments for the programs of the KFKI and the requirements of the economy of the country. In order to satisfy the orders received and to preserve and continually develop a high level of technology, intensive research is conducted in some areas.

The above listing of the activities of the research institutes is of course not complete. Because of its catalog-like account it cannot give a proper illustration of the nature of these activities. We attempt, therefore, on the following pages to illustrate a selected group of the results of which the KFKI is proud and which give an idea of the level and extent of the research and development work taking place in the KFKI. These will relate principally to applications.

Compared to the applications the results of basic research at the KFKI are relatively less well known. Fortunately even in this field there is a wide selection; only the most spectacular results will be described here.

According to our present knowledge, the nuclides making up the atomic nucleus, the proton and the neutron, also have structure. The supposed building blocks are the quarks which one could not observe directly before. The energy exchange between quarks is mediated by a force field the quanta of which (as in the case of photons) are the gluons. The experimental particle physicists of the KFKI working with a group at the CERN [European Center for Nuclear Research] have shown with a series of complex experiments the existence of gluons, thus furnishing indirect proof of the existence of quarks.

Finally a few words about one of the largest undertakings of the KFKI, its participation in the VEGA space experiment.

An unusual opportunity in space research is presented by the return of Halley's comet in 1986. Two space probes have been sent up from the Soviet Union in the framework of the Intercosmos cooperative program to study the comet in situ, these are the VEGA-1 and the VEGA-2. These space probes carry various scientific instruments and a television camera based on a CCD matrix.

When approaching the comet, these probes will be the first to attempt to send pictures to Earth. This will allow the direct study of the core of the comet and its body and tail. Two instruments of the VEGA probes (TUNDE and PLAZMAG), the central data collecting system and what is most important, the intelligent TV system, were developed by the KFKI. If the space experiment is successful, then on 6 March 1986 humanity will see a television picture of Halley's comet for the first time.

Sometimes it appears that the work of the KFKI is better known outside Hungary than within. This is primarily our fault. This brief summary is meant to fill this gap and to announce that we are doing our job here on top of the mountain.

Opinion of Notables

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "What Do You Think of the KFKI?"]

[Text] Colonel Bertalan Farkas:

I came in contact with the KFKI, more specifically, with its "Pille" instrument during the Soviet-Hungarian space flight 5 years ago. The instrument was developed by the staff of the KFKI in the framework of the Interkosmos program. Its importance is gigantic because for the first time it has allowed the cosmonaut to measure the radiation dose affecting him while in space.

It is known that the people living on earth are protected reliably against cosmic radiation by the atmosphere and the magnetic field of the Earth. As we move away from the Earth's surface, however, the strength of the

cosmic radiation increases. Those spaceships and other space objects in which people travel move about 350 kilometers above the surface, because at this height cosmic radiation is still supportable and does not endanger the health of the cosmonaut. The radiation load of the cosmonauts must, however, be checked because unforeseen events may easily occur.

Formerly the radiation measurements made in the spaceship could be evaluated only after arrival on Earth and the radiation load received by the cosmonaut could be measured only at that time. The Pille instrument, which got its name from being so small and light in comparison to other dose measuring devices, reads from its internal dose-sensitive probes the amount of radiation it has received. The shape of the dose-sensitive probes and their container resembles that of a fountain pen. The probes are taken from the space suit or from the wall of the space capsule and are put into the main Pille instrument. After one minute the instrument automatically indicates the amount of the radiation dose. The instrument uses about as much current as the parking lights of a car. It might prove exceptionally valuable on a space walk. The success of the construction is proven by the fact that an improved version of the Pille has again been sent into space.

Dr Sandor Biro, chief of internal medicine and cardiologist at the Central State Hospital:

In 1977 the Central State Hospital signed a socialist work contract with the KFKI to implement an electrocardiographic system, code named "Budapest." The project was initiated by Dr Zoltan Antaloczy, the director of the OTKI's Second Internal Clinic. The intent of the KFKI was to use its measuring and computer experience in the field of bioelectronics and diagnostic cardiology.

We tried to duplicate the logic of medical diagnosis with computer methods and we attempted to produce a diagnostic system which is able to process automatically the electrocardiogram [EKG], and which can arrive at and communicate a diagnosis. This very large-scale project is in its ninth year now. First we had a more primitive recording system which stored the EKG signals on tape. The tapes were processed in the KFKI by computer and we received the interpretation.

In April 1983 we received our new instrumentation. Here a computer records the spacial EKG. The system is presently capable of recognizing all clinical changes that can be found in a modern EKG diagnostic text. With the workers of the KFKI we have developed an exceptionally good collegial relationship. One sign of our satisfaction is that we are in the process of signing another socialist work contract aimed at the further development of the present system, the trials of new programs, and the cooperative refinement of a computer-based EKG diagnostic system. The KFKI has proven that computer technology can be extended past its usual fields of application and can be applied to medical diagnostics.

Dr Janos Toth, first secretary of the MTESZ [Federation of Technical and Scientific Associations]:

I have easily recalled memories of the largest of our national research institutes. I remember Lajos Janossy, Pal Lenard and Ferenc Szabo of the institute that was the first to recognize the importance of atomic energy and that urged the immediate construction of the power station at Paks. All aspects of the chain of innovation, from basic research to marketing, can be found among the activities of the institute.

I know that many in the KFKI think that research and manufacturing are irreconcilably opposed to each other. I, however, agree with those who find it useful to have the research and manufacturing capability demonstrated in the field of lasers, atomic energy and computers. The enterprising nature of the institute has made it possible for its experts to conduct basic research on the international level. They have also built up good relations with manufacturing firms such as the MOM [Hungarian Optical Works]. In their relations with industry they have not rejected risk taking.

Insight can be gained from the examination of people's lives. I have seen that one part of the public thinks more highly of a scientist if he also has a leading bureaucratic position. It is indeed possible to have a role in public life while being a scientist; it is even possible to be a politician and to do scientific work. The alliance of science and socialism not only makes this possible but also requires it. I have been bothered more than once by the bureaucracy found in scientific life. Why does someone have to write a "scientific work" when his whole career has established him in science? I hope that fewer and fewer scientists will have to do this in the future. I meet the scientists of the institute every day because they are there among the members of leaders of the MTESZ. Ferenc Szabo, the director of the KFKI is also the vice-president of the MTESZ.

Istvan Alfoldi, branch director of the Computer Center of the Central Statistical Office (KSH):

We have started a major project with the KFKI in 1978. This involved the building of the decentralized data-processing system of the KSH. In the 19 county centers and in the Budapest center work has been conducted under primitive circumstances, with antiquated electronic devices, sometimes even by hand. Only the computer center at the KSH was equipped to do serious data-processing by machine. To satisfy the increasingly serious demands placed on the statistical information system, it became necessary to increase the machine pool used for the information system. Taking into consideration the professional and economic requirements, we found the KFKI's TPA-11 computer family to be the best. Since that time we have been in constant close contact with the institute.

The KFKI has advised and helped us primarily in the hardware area. This involved working together on the planning of the type of equipment to be used for the data processing demands of each county, and on the installation of the equipment. We have finished the project in September 1984, with

very good results. The KFKI has conducted the installation with great expertise and has helped us during the break-in period.

Our relationship will not be terminated soon because we are already thinking about the next common task. This will be the establishment of communication between the new machines via the postal data transmission system. We will connect the computers in the counties with more modern, larger TPA-11/440 megamini-type computers which will control the national data transmission. The national data-processing work will be faster and more efficient this way.

Circuitry Design

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "The AULA-3 Designs"]

[Text] The Research Institute for Microelectronics [MK] develops basic microelectronic materials, technologies and tools. It also conducts basic research.

Designing and Building Circuits

A multitude of transistors is formed with suitable microelectronic techniques on prefabricated circuit boards (English acronym, ULA). On these boards only the metal-to-metal connections need be established. This pattern of metal connections determines what function the circuit will have ultimately. The user prepares this pattern to satisfy his own requirements.

The institute carries out all steps of the above process, it manufactures the prefabricated circuit boards of each type, it develops the computer system which aids in the design of the user-specified metal connection pattern, and it manufactures this pattern.

Three basic circuits are manufactured: the U224 and the DYNULA are made with n-MOS technology, the CG types with CMOS technology. Among users the last are the most popular.

Inside the CG circuit there are repeated building blocks of 10 transistors suitable for different logical functions and there are shielded paths for crossing conductors over each other. At the edge there are input/output cells. The size of the smallest member of CGA family is 3.2 by 2.7 millimeter. It is constructed of 56 basic building blocks and 32 input/output cells. For each circuit we have the graphic devices, handbooks, guides for manual design, and also the AULA-3 computer system for the most efficient way of designing.

This system makes it possible even for engineers not familiar with microelectronics to develop their own integrated circuits. The circuit parts can be called up from the computer's library and all that is needed is to connect the outcoming leads in the proper manner. The users of the

AULA-3 system work in front of the screen connected to the computer on which the circuit or its part is projected. If the engineer points to a spot, the symbol of the part called up from the library appears there. By moving a set of cross-hairs, the path of the metal connectors can be established.

The AULA-3 is suitable for designing prefabricated circuits independent of the technology and the type of the circuit. The system can be operated on the TPA 1140 and larger compatible computers. The largest circuit that can be constructed contains several thousand transistors. The interactive layout designing program works on different displays, from alphanumeric terminals to color displays. Basic logic gates can be called up from the library, which can be expanded. Presently it is suitable for single-layer wiring, but automatic programs capable of 2 and 3-layer wiring are under development. The AULA-3 is compatible with the programs (simulation, test generation) of the microelectronic Integrated Design System (ITR); its descriptive languages are utilized.

Those larger companies which want to use a great variety and large quantities of specifically designed integrated circuits will find it valuable to set up a laboratory where they themselves can put the final touches on the prefabricated circuit elements. The KFKI, building on its several decade old technical experience, has developed the plans for the equipment of a turn-key laboratory which permits the customer to start the small-scale manufacturing of custom circuits. This system, covering everything from computer-aided design to the construction of the outside containers, requires an investment of 100 million forints.

Technological Equipment

The digital electronic balance of the type NHZ-213 is a general-use weight measuring instrument with a sensitivity of 0.1 grams and a range of 10 kilograms. It is suitable for weighing in and out of the laboratory. Its stability over time and over temperature variations makes it suitable for long series of measurements. The results are available on a 6-digit digital display and on a standard parallel output port. This permits connection to a digital data collecting system.

The Telemic-2 TV micrometer is used for the high precision size determination of planar geometrical shapes in the micrometer range. It can be linked to any television camera and can also be used with a microscope.

Lasers, Glass Metal

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "Metal Glass and Laser"]

[Text] The activity of the Solid Body Research Institute--to use traditional terms--is partly in the area of basic research and partly in research and development. It makes a contribution to the major national research topic "solid body research."

In this institute research is done on glass metals, the alloys with amorphous structure that form when melted metals are cooled extremely rapidly. Many techniques of the physics of metals are used to explore the structure, the magnetic, mechanical and electric properties of these new materials.

Besides basic research the institute is also engaged in the preparation of the practical utilization of glass metals. They have developed glass-metal-containing selection coils, small special transformers and contact switches with amorphous coatings.

Successful experiments have been conducted with the State Building Company of the Duna-Tisz.Koz for the use of glass metal bands in concrete, as a fiber to lend strength. For years they have cooperated with the Metal Works of Csepel which is able to manufacture the glass metals.

Among the amorphous semiconductors, silicon is to be mentioned as a promising material. This substance can be made relatively cheaply, at 10,000 times less cost than crystalline silicon. Its mechanical properties are advantageous in that it is flexible, in contrast to the rigidity of crystalline silicon. It can be used for a solar cell, that is, a light to electricity converter.

The present objective is to improve the conversion efficiency. The achievement of an 8-10 percent efficiency, given a suitable manufacturing process, would revolutionize the energy supply of electronic and private use.

One tangible Hungarian achievement in the field of liquid crystals is thermography. A future goal is the development of very fast switching liquid crystal displays which work in a few microseconds, versus hundreds of milliseconds now.

The results obtained in the area of laser research and development would deserve a separate page. A few of the Hungarian areas of application: medicine, distance measurement, machine production, the arts and entertainment.

Beyond several large installations for basic research the staff also makes measuring instruments that they design themselves and which are suitable for industrial measurements, principally for the investigation of magnetic properties. Some of these instruments are the different histerographs, measuring devices for magnetic induction, space, permeability, susceptibility; Barkhousen noise analyzer, a contactless resistance meter. The Metaltester was designed expressly for industrial use. It can examine the composition and fiber structure, and it can detect welding seams, surface imperfections, inclusions and cracks.

Next to the research reactor of the KFKI the acute-angle neutron scattering experiment is going on, a technique by which microinhomogeneities such as the increase in the coarseness of the grains on the surface of a turbine blade under stress can be detected.

Radiography is also based on the radiation source of the nuclear reactor. This technique permits the photography of the flow behavior of hydrogen-containing liquids in devices that are not transparent optically but are so to neutrons.

Among the methods of nuclear origin, nuclear magnetic resonance (NMR) and Mossbauer spectroscopy should be mentioned. Information obtainable from these is important for the plastics, pharmaceutical, and metal industries and for physiology. An examination of NMR and Mossbauer--sensitive nuclei in our surroundings can reveal information about the amorphous/crystalline ratio, binding conditions, magnetic properties, and the abnormal transformation of living matter.

Particle, Nuclear Physics

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "Particles on Film"]

[Text] The technical staff of the Particle and Nuclear Physics Research Institute has several decades' experience in the planning, development and production of equipment necessary for particle and nuclear research.

In particle physics research the accelerated particles collide with some kind of material, and from a measurement of the paths of the scattered particles from this collision reaction it is possible to make conclusions about the kind, energy, or type of reaction.

To detect the paths of the particles, point-sensitive detectors are frequently employed, such as proportional multiplier cameras. In years past a whole series of multi-fiber proportional cameras was designed at the institute, from a 128 by 128 millimeter active surface to a 2000 by 1000 millimeter active surface. The cameras are in general made in a manner that permits the determination of one (x) or two mutually perpendicular coordinates (x,y). Depending on the physical task, however, cameras used to measure non-mutually perpendicular coordinates (u,v) with slanted fibers, and even x,y,u,v coordinate cameras are made. The resolution of the cameras is 1-2 millimeter. Special equipment was developed for the manufacture of the proportional cameras such as the cable tension measuring device which is exported throughout Europe. The cameras and the associated electronic displays have been operating at the United Atom Research Institute at Dubna, at the Serpukhov Accelerator and at the Nuclear Physics Institute of Leningrad.

A different way to register the paths of particles is to use trace detectors (bubble streamer cameras). With this technique one photographs the particle tracks in the trace detectors with pairs of stereo images. The pictures can then be evaluated on a measuring table.

A whole series of equipment was developed for the evaluation of films: a four-film projector, a cable coordinate measuring device and an automatic film evaluator (RIMA). This last device consists of a computer-controlled

film manipulator and an image reader which is a 1728-element linear CCD [charge coupled device]. The reading of the elements of each picture is accomplished by the CCD itself, in the other direction it is accomplished by the slow movement of the film. An accuracy of 15 micrometers is achieved. The evaluation of the light or dark pixels is the basis for the recognition of individual bubbles and streamers, their size and coordinates, the selection of the related bubbles and streamers and, finally, the recording of the detected particle traces. An important part of the system is the color graphics display connected to the computer. This has general utility beyond particle physics experiments.

A whole series of instruments was also developed for nuclear investigations and for applied nuclear research. After the development of the modular nuclear instrument family, analog and digital CAMAC instruments were developed to satisfy the needs of the nuclear measuring technologies. Presently work is underway on a family of instruments which can be connected to newer computers. Of the instruments, the nuclear spectrometer and the vacuum measuring device deserve mention. From the nuclear instruments produced here, significant quantities have gone and are going to industrial laboratories in Hungary and in the neighboring countries.

Space Instruments

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "Pille in Space"]

[Text] Who would believe it! An atomic reactor has been operating in Hungary for the last 26 years. In our excitement over the construction of the nuclear power station at Paks, we have almost forgotten about the first reactor, that of the KFKI, where generations of specialists learned one of the trades of the 20th century.

The first-line task of the Atomic Energy Institute is the scientific support of the atomic energy program in Hungary. The research work of the past 10 years has been linked with the construction, start-up and operation of the atomic power station at Paks. A critical system (ZR-6) was constructed with which, in cooperation with other socialist countries, the neutron-physics processes inside the reactor were clarified. A computer programming system was developed and experimentally verified and measuring techniques and instruments were developed that work under the conditions found in nuclear power stations.

Research on the cooling and safety of the reactor was conducted with the "high pressure water loop." This construction was modified so that the primary loop of the Paks station could be modeled. In the course of the investigation several questions relating to the safety of the atomic reactor were answered and recommendations were made, which were then incorporated into Soviet design practice and have contributed to the economic operation of the Paks nuclear power station.

Originally several methods and instruments were developed for on-site radiation protection at the KFKI. Later, on the basis of the dosimetric protective system of the KFKI, an environmental control system was built at Paks which is remarkable even by international standards for its high sensitivity. Beyond this, a whole-body counting system was developed in support of Hungarian medical-biological research, and a thermoluminescent dosimeter, used in multiple ways, was also designed. Best known is the Pille space dosimeter which was used on the Salut-6 space station and on other space flights, always giving a very satisfactory performance.

For the control of the reactors built at the KFKI, and for handling the measurements associated with these, several instruments and reactor-directing systems were constructed. These gave rise to the development of a whole "Nuclear Industrial Instrument Family." Many measurements could be made with its members both in Hungary and abroad.

An acustic emission instrument was produced for the determination of the mechanical fracture-state of tanks under pressure and of geological layers. A 32-channel system in a bus functions as a moving laboratory and a 4-channel version as the DEFECTOPHONE portable instrument.

To determine the speed of flow of the cooling fluid in the ducts of the reactor, a device was developed that works on a correlational principle; it has proved successful in several fields. On the strength of its experience for the control of critical systems, a computerized control system was built for the VVRSZ research reactor. It is able to perform passive (data gathering and display) and active (control) tasks. Building on these results the task of designing the computerized control system at the Paks nuclear power station was undertaken.

The research at the KFKI has given rise to a whole series of analytical chemistry problems. Those deserving mention are the reactor and neutron-generating activation analysis methods of great sensitivity, and mass spectroscopy which makes it possible to determine the isotopic composition of a wide variety of materials. These analytical chemistry methods of the KFKI can be used in industry and research, notably in the Hungarian microelectronics industry. Several analytical, corrosion and water-chemistry problems have presented themselves during the operation of the Paks atomic energy station, all of which could be solved.

Concerning long-term energy sources, certain theoretical problems of the utilization of solar energy are being investigated.

The KFKI has operated its VVRSZ-type research reactor since 1959. Its current output is 5 megawatts. In addition to being the basis of Hungarian isotope production, it has made possible research in neutron physics and in nuclear and hot-atom chemistry. The planned lifespan of the reactor will come to an end this year. A general reconstruction will start next year. The output will increase to 20 megawatts and, as a consequence, the reactor at Csilleberc will reach the international middle size category.

Computers

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "From Utopia to the TPA"]

[Text] The attention of the KFKI has been directed since the middle of the sixties towards solving problems with the computer. The first significant step in this direction was the introduction of the TPA-1001 minicomputer.

The capabilities of this machine with 4K operational memory and transistorized circuits are so modest by today's standards that they make one smile. Yet, this unit led the way from the complicated analog devices to the universal computers that can perform the job of many instruments and can also control them. The abbreviation TPA preserves the marks of this change, it stands for Tarolt Programozo Analizator [Stored Programming Analyzer], indicating that it was derived from the KFKI's experience with multi-channel nuclear analyzers.

In the almost two decades that have passed since that time the MSZKI has come a long way. New machines and families of machines were designed and with diligent work the small scale production of these and their component units was organized. The KFKI has strived from the beginning not only to produce and sell computers but also to solve problems by utilizing them. In this view the production of computers, the connection to peripherals, and in general, the development of hardware is a necessary evil. The KFKI has produced more than 800 systems by 1984.

The first major area of application was the automation of laboratory measurements; the interest and the demands were great. The construction of computer systems was not only successful financially but it became an excellent tool for barter; it permitted the entry into top-line international physics research as computers became the esperanto of interdisciplinary scientific contacts. It is understandable that due to the nature of the KFKI most applications are found in the area of physics, but the total picture shows other things as well. The area of the automation of measurements is distributed in the following way: physics research 40 percent, chemical and analytical research 20 percent, medical-biological areas 20 percent, agriculture 6 percent and others 14 percent.

The automation of measurements by computer requires a large variety of measuring and controlling units, converters, data collectors, storing devices, and so on. The KFKI has decided to conform to the internationally used CAMAC peripherals protocol and has developed a range of CAMAC units.

For example, such units were used to build the automatic measuring system of the fusion experiment which was a common project of the Kurchatov Atomic Energy Institute in Moscow and the KFKI. To indicate the size and complexity of the system, it might be mentioned that in its final form it will consist of 64 processors of which 14 will be in TPA-1148 megamini computers. (The TPA-1148 is an advanced version of the TPA-11 series, occasioned by the

increased demands of the users. The memory of this computer can be increased to 4 megabytes, it has chache-type rapid memory and can be operated from an intelligent console equipped with its own processor).

Besides the automation of laboratory measurements, industrial supervision and control systems were also designed. Among these the most important are perhaps the systems installed in electrical power stations. They give advice based on on-line measurements and by documenting processes they help in recognizing alarm situations. They also allow post-mortem analysis which permits the unraveling of the causes of operational disturbances by an examination of their history.

The industrial systems of the MSZKI perform in a variety of settings. In the automobile plant in Kama (the KAMAZ) they perform the testing of diesel engines on the test-pad, in the gas and oil industry they direct pipeline deliveries, railroad car loading and the management of container depots. An important role is played by these industrial systems in the National Telemechanical System where, for example, they were involved in minimalizing the effects of the energy restrictions during the past winter.

The third major area of computer activity of the KFKI is the automation of business. The first goal here is to set up an on-line transaction processing system. In this arrangement the computer terminals at the particular work site do all the processing of the business transactions, and the transactions together with their consequences are immediately entered into a central data bank. This type of system is absolutely necessary nowadays in banks, storage houses, travel bureaus and in the direction of production. This is why the offices of the county councils were computerized and why similar systems were installed at the Postal Service, the Office of Water Control and at the KSH [Central Statistical Bureau].

The MSZKI is specialized for the solution of varied, often very complex tasks. One part of the problems requires a fast, modern, modular computer. To answer the demand, the TPA-11/440 computer was built. It is a 32-bit machine which communicates with peripherals easily and relatively cheaply and has a more effective set of commands. This computer was awarded the grand prize of the National Trade Fair at Budapest in 1985.

To cope with the other aspects of its task, especially problems requiring several smaller computers and intelligent terminals, it was necessary to design smaller devices. Thus was created the TPA Janus which is a combination of two machines with different architectures and the TPA QUADRO, a professional microcomputer.

The current stock of instruments of the KFKI makes possible a variety of interesting computer applications. Because of the steady increase in demands, however, it was necessary to take the next step as well and a computer which is more powerful than the current megamini machines is under development. To solve smaller problems a 32 bit microcomputer is necessary which, thanks to the rapid progress of microprocessor technology, is already feasible. Rapid and decisive steps must also be taken to develop local

networking. The software and hardware researchers and the experts of technology at the KFKI face much interesting work in the future.

Research, Production

Budapest OTLET in Hungarian 27 Jun 85 pp 18-24

[Article: "Conducts Research and Manufactures"]

[Text] The Technical Directorate (MSZI) is the central technical service of the KFKI. Its "charter" prescribes that it design and produce the individual devices necessary for physics research and for assuring a suitable technical infrastructure.

The MSZI designs and builds on the average 60-70 unique pieces of equipment a year. Its area of responsibility includes vacuum technology, pneumatics, the technology of nuclear and activation analysis, optical mechanics, as well as the automation of measurements and the development of computer peripherals, done in close cooperation with the other research institutes of the KFKI.

It also conducts independent applied research in the fields of vibration diagnostics with special attention to problems of structural dynamics, and it is engaged in significant research and development activity in the area of medical technology. It has received international recognition for its research and development of methods of computer-assisted cardiological examination and data evaluation.

In past years the following significant products came from its laboratories:

--Laboratory for the Standardization of Nuclear Instruments in Atomic Power Stations;

--Technical systems related to microcircuitry such as high-pressure oxidizer, laser-operated heat treatment device, planar plasma lathe and single-crystal growing systems;

--Complete activation analysis laboratory;

--Microcomputer-governed process control and steering systems;

--Different types of laboratory temperatures control devices;

--Astronomical and space research devices.

Characteristic of the work conducted at the MSZI, due to its obligation to serve basic research with finished products, are the very intensive technological development activity and the short deadlines. Another characteristic is that it looks for the utilization of even the newest results of basic research. This is how the automatically controlled crystal growing system and the modular Mossbauer spectrometer were produced.

After the discovery of the Mossbauer effect and realizing the possibilities inherent in it for measurement, a group consisting of a few engineers and technicians, together with the experienced workers of the workshops has put on the market after two years, planning included, a complete spectrometer.

The tasks at hand have made it necessary to modernize the manufacturing facilities and the methodology of planning and designing. The use of the CNC working systems is commonplace. The construction of the basis for low-impurity, ultrafine mechanical work, suitable for the manufacture of high-capacity computer peripherals is in progress. One of the large-scale goals of the next 5-Year Plan is the introduction of computer-aided engineering design throughout the facility.

12846
CSO: 2502/66

SOVIET COOPERATION IN COMPUTER NETWORKS, TELEDATA PROCESSING

Budapest MUSZAKI ELET in Hungarian 17 Aug 85 p 3

[Article by Dr Geza Odor: "Hungarian-Soviet Cooperation; Computer Networks, Remote Data Processing"]

[Text] Leaders of the Hungarian OMFB [National Technical Development Committee] and MTA [Hungarian Academy of Sciences] and of the Scientific and Technical State Committee of the Soviet Union signed a science and technology cooperation agreement pertaining to the creation of computer networks and remote data processing systems and devices in Moscow in March 1983. In Moscow on 9 July 1985, the agreement originally valid to 31 December 1985 was extended to 31 December 1990.

The agreement program involves work on the following themes:

--information computer networks, their architecture and supplying them with software;

--providing software for systems serving to model and design heterogeneous computer systems and for administrative functions;

--theory and applications connected with creation of databanks and computer networks;

--a multi-purpose distributed remote data-processing system to provide organizations with information, based on the Hungarian-made HTAF devices, including the EC-8372 TAF [remote data processing] processor, the EC-8534 intelligent terminal and other outstation AP models;

--an automated information exchange system and its experimental operation between the Hungarian People's Republic and the Soviet Union;

--software tools for an ESZR [uniform computer technology system] network TAF system;

--a Minnyeftyegazstroy information-computer network and its introduction for operational planning and control of petroleum and gas industry project construction;

--creation and introduction of the Mingazprom computer network on the basis of developed subscriber systems and the Hungarian-made TAF devices, for an automated system to collect, transmit and display technological information for the Uniform Gas Supply System of the Soviet Union;

--remote data processing hardware and software tools and local and distributed computer networks for the information agencies of the socialist countries and introduction of these in the collection and distribution network of TASS to be developed;

--development and introduction of network TAF architecture into the multi-level hierarchic information exchange network of the Uniform Energetics System (EER) of the Soviet Union, on the basis of Hungarian-made TAF devices;

--a petroleum industry computer network with radical ring topology;

--research and development on large capacity data transmission devices for real time distributed information systems;

--versions I and II of the EC-8534 terminal for the system of the Agricultural Ministry of the Soviet Union;

--changes in the image processing complex for the system of the Agricultural Ministry of the Soviet Union, with possibilities for transmitting images via telecommunications channels;

--a color, metal tone ESZR display (Orion) for the system of the Agricultural Ministry of the Soviet Union;

--an information computer network, taking into consideration the standards of international organizations and of the SZKB [Intergovernment Computer Technology Committee], for operational control of the Uniform Energetics System (EER) of the Soviet Union;

--a program tool complex for the automation of information activity on the basis of microcomputers and standard local computer networks;

--a series of intelligent terminal systems on the basis of Hungarian remote data processing devices for the apparatus, enterprises and institutes of the Agricultural Machine Industry Ministry of the Soviet Union. Organization and coordination will be handled on the Hungarian side by the OMFB and the MTA and on the Soviet side by the Scientific and Technical State Committee. For the most part, the SZTAKI [Computer Technology and Automation Research Institute], Terta and Videoton will cooperate with Soviet partner institutions in solving the various tasks.

Experts of the contracting parties will hold talks at least once per year at which they will discuss the status of execution of the agreement and carry out the necessary changes and refinements or supplement the themes.

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REMEDY SOUGHT FOR DECLINING AGRICULTURAL RESEARCH

Budapest MUSZAKI ELET in Hungarian 17 Aug 85 p 5

[Interview with Dr Janos Borsos, deputy chief of the Professional Education and Research Department of the Ministry of Agriculture and Food, by Ferenc Bokodi: "Our Position Could Be Lost, Right?"]

[Text] [Question] Agricultural production and research in our homeland are characterized by an ever strengthening innovation readiness and demand; in contrast to this, material supply to agricultural researchers is approaching the critical point. For this reason a re-evaluation of agricultural R&D and an improvement in its operational conditions are justified and urgent tasks.

[Answer] We could show the effectiveness of agricultural research with many data. Each year those improving crops produce 50-60 new strains, and an additional 10-15 strains are adopted. In the case of wheat, for example, strains created as a result of agricultural research here at home are planted on 54 percent of the sown area. Out of roughly 50 types of animals generally raised, 25 are stock improved domestically. New herbicides have appeared, and it is to the credit of the research sites of the MEM [Ministry of Agriculture and Food] and of the MTA [Hungarian Academy of Sciences] that internationally recognized front rank results have been achieved in the areas of plant genetics and biology, resistance biology, soil studies and veterinary virology.

[Question] Under what conditions do the scientific research sites carry out their tasks?

[Answer] It is rather difficult to give a characteristic evaluation of the personnel and objective conditions. Before last year, 10,300 workers participated in the scientific work of the 53 institutions under the immediate supervision of the MEM and the MTA; 2,100 of these were scientific researchers, 1,250 were instructors-researchers, and 510 were graduate technicians. But in 5 years, the number of auxiliary personnel so important for scientific research has decreased to less than half.

Poor Supply

[Question] Is research work attractive?

[Answer] It appears that it is not. It represents a serious problem at the agricultural research sites that few young people, compared to the needs, select research work as a profession.

[Question] What characterizes the material supply at the research sites?

[Answer] We began to develop the agricultural research sites intensively 15 years ago, as a result of which by the second half of the 1970's they had the equipment to permit high level research work. We are enjoying the scientific results of this period today. At present, however, even the conditions for keeping up the level are not given at these once flourishing bases. Their supply of instruments and equipment is poor, and the present economic possibilities are creating an increasingly disadvantageous situation. The average age of the instruments is 8.3 years; only 8.6 percent of the gross value is available each year for replacement, renovation or expansion of the instrument park. The limits on acquisition of periodicals requiring foreign exchange are already holding back valuable scientific research work.

[Question] What sources feed the research programs?

[Answer] We spend an average of 1.5 billion forints each year on branch R&D programs. This covers about 75 percent of the wage and maintenance costs, thus about 25 percent of the sources for agricultural research have to be "worked out" by the institutions.

[Question] One could hardly call this state of affairs ideal....

[Answer] Valuable scientific resources have to be employed on routine tasks, providing scientific services.

[Question] How do you see the situation of agricultural research in comparison to other branches of science?

[Answer] The branch is contributing to the production of national income to an increasing degree, by 16-22 percent per year. In contrast to this our percentage share of national R&D expenditures has gradually decreased over the past 15 years. According to a survey by the Central Statistics Office this ratio has fallen from 13.3 percent in 1970 to 7.7 percent in 1983. Compared to the other branches of science the unfavorable change has been greatest in the agricultural branch.

Coordination of Interests

[Question] What dangers might this represent?

[Answer] The world market ranks the agricultural R&D activity of every country. The quality of products, efficiency of expenditures, intellectual activity and tools of production are all measured there. This is the most

pressing constraint urging to re-evaluate the guidance of R&D and to improve supply. The source reduction for agricultural R&D affects domestic research unfavorably, and unfortunately this endangers our world market positions too. It is necessary for the share of agricultural research to at least approach the scope of its contribution to the production of national income, at least the 13-14 percent share of the 1970's.

[Question] How could new moneys get to the research ranks?

[Answer] It seemed appropriate to coordinate the interests of the institutions and enterprises, for example with a variety use fee. This would be a suitable source for maintaining and propagating the strain and would offer an opportunity for the quicker spread of new varieties and for satisfying international demand. Introduction of this fee might be justified in animal breeding also, but feeding back into the R&D domain of the branch a part of the profit deriving from the introduction of new technologies and production methods is still unsolved, although this might accelerate the innovation cycle.

[Question] What characterizes the fate of research results today?

[Answer] The obsolescence process has accelerated along with the immediate practical significance. All scientific effort is futile if we cannot create the conditions for quick practical utilization. The greater the time lost due to that the smaller the economic profit as well. Creating material interest with the aid of economic regulators for the institutions and enterprises participating in the innovation chain is very essential. Frequently it has already been found useful for the research sites and the farms and commercial enterprises to create partnership or association forms in order to apply or disseminate research results.

[Question] How great is our country's participation in international scientific research?

[Answer] Agricultural scientific research is built on broad international cooperation. Cooperative research is being done on nearly 320 themes; we are doing 87 percent of this on the basis of cooperation contracts signed with CEMA member states. It is absolutely necessary that in the period of the Seventh 5-Year Plan the international cooperation contracts should form the backbone of the R&D plans, because only in this way can a truly efficient and creative international division of scientific labor develop, a division of labor which will contribute reliably with its achievements to increasing food production in the member states.

Themes of Immediate Future

[Question] What sort of themes form the key questions for the research tasks of the future?

[Answer] Those which are intended to increase the international competitiveness of the products of agriculture and the foodstuffs industry and make it possible for a higher intellectual labor content to characterize our

goods. There is a need to reduce expenditures, not only by moderating the one-time expenditures but also through broader reutilization of by-products and waste. We must increase the productivity of plant and animal varieties. There is a need to increase the efficiency of energy conversion at every level of production, by improving strains, with biological methods and with automation. The use of biotechnology can uncover gigantic reserves in foodstuffs production, as can the broader spread of microelectronics, computer technology and automation in production technologies.

[Question] What changes will there be in the guidance of branch R&D?

[Answer] According to the ideas the scientific democracy of the institutions and the enterprise institutional independence must both be increased. We would like to increase the demarcation and coordination of state (strategic and operational), enterprise, research site and special area tasks.

We must realize flexible financing in the area of state and enterprise orders. Using the tools of regulation we must achieve indirect guidance and orientation and uncover entrepreneurial skills; we must help realize individual responsibility, not only in the leadership but also in the execution of the various R&D tasks.

The entrepreneurial type R&D organizations, such as the Agricultural Innovation Association, serve these goals. In the interest of the creation of R&D funds--involving a competition system and decentralized guidance--and guidance of R&D tasks the Ministry of Agriculture and Food has created a ministerial R&D Council which has already developed a competition system for research commissions and a bank type financing system for them.

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COUNCIL COMPUTER SYSTEMS HELD INEFFECTIVE

Budapest MAGYAR HIRLAP in Hungarian 7 Sep 85 p 5

[Interview with Matyas Gaspar, director of FOSZI [Organization and Computer Technology Institute of the Capital Council] by Istvan Graner: "A Program to Set Things Right; Computer Technology in the Councils"]

[Text] The spread of computer technology in the most varied areas of our lives is a necessity dictated by our age. The councils did not want to be left behind in this competition either; they have spent several hundreds of millions on computers and programs. But the process which began about 15 years ago has had hardly any tangible results.Most often the vehemence of the organizational firms, which are spreading like mushrooms, was exhausted in obtaining the orders; for the most part the utility or introduction of the programs left them cold.

"Too many cooks spoil the soup," was the verdict long since of experts studying with alarm the computerization of the councils. To show that their pessimism was not without foundation, here are the facts. Implementation of the mechanization program has been divided up among about 10-15 organizational institutes for the past 10 years or more. A good many of them--such as FOINFORM, FESZTIK, FOTAKEH and the computer section of the Real Estate Settlement Office--were created expressly to make the work of the council apparatus more efficient with the aid of computers, according to the requirements of the age. According to the most modest calculations they spent more than half a billion in the capital for this purpose, for example to develop the data files needed for operations and to prepare the programs. But with the passing of the years it became increasingly evident that it was not working, there are hardly any tangible results despite the enormous expenditures. And those responsible, instead of trying to create order in the household of mechanization, increased the number of cooks. And so, on 1 July 1984, they created the Organization and Computer Technology Institute of the Capital Council, the FOSZI. Why was this needed? we asked Matyas Gaspar, director of the institute.

Childhood Diseases

[Answer] Computerization of council work and the spread of modern organizational measures began about 10-15 years ago--as in other areas. Since it was a program of major importance a lot of people at the time saw prospects

in it, innumerable new organizations were formed, usually with organizers just getting started and newly recruited from other areas. This was one side. But on the other side stood the users, without experience in computer technology, the majority of whom did not even know what they wanted to do with the program ordered or the systems prepared for them. And more than a few people exploited this "ignorance". A lot of money was pumped out of the capital to develop various systems--including one for uniform public works record keeping. This one, for example, has not been finished yet. And even the great majority of the jobs finished cannot be used. Because of obsolescence only a small portion of the programs prepared thus far, worth several hundred millions, can be used in the future--among other things for population record keeping. So even if we cannot find a report which says so, a large part of this sum was thrown out the window.

[Question] So the FOSZI is called on to create order?

[Answer] We might put it that way. But it must be recognized first of all that our institute has no sort of authoritative rights. In part we are working as an independent budgetary unit under the guidance of the secretariat of the Capital Council. This means--among other things--that the chief of the secretariat approves our work plan, and we do the organizational jobs figuring in that plan for the capital and capital district councils free of charge.

[Question] Without authoritative rights, as an equal of the other organizational institutes, how can you bring influence to bear to get mechanization into a uniform channel?

[Answer] The executive committee decision creating our institute emphasized that the development of uniform computer technology and administrative/organizational guidance and supervision of it must be pressed forward as soon as possible in the capital.

[Question] This is obvious in theory, but the practice paints a different picture--even now. The special administrative units of the capital and the capital district councils can order computers independently, on their own decision, and can have programs prepared with anyone--to the limit of their material possibilities. If there is no change in this then your idea will be worth little.

[Answer] That really is how things are going now, and there can be a change in this only if the financing of the entire program gets into a single hand. Today it still really happens that, for example, a main directorate will have the same program developed which would be needed by a main department. And even if it is in-house, one does not know about the action of the other.

Money Thrown Away?

[Question] So waste is unavoidable. Would it not be useful to keep central records about programs in use, where those interested could get information?

[Answer] Previously there was no such compilation, but we have already made up a quick inventory. It is true that this was prepared only on the basis of

"confessions" but it is better than nothing. We sent this survey to virtually every council institution, but not many availed themselves of the possibility of a cheaper take-over. The situation has changed in the past month, however. Not long ago we organized an exhibit where we showed the various machines and programs being used by the councils. For example, those interested could see the mechanized record keeping of reports of general interest, public works associations and artisans. Since then more city districts have indicated that they would like to use this or that system. I feel that this method of "leading them to it" is much more effective than administrative coercion.

[Question] This is a question of attitude and concept. In any case I consider it a waste if a city district spends money for something--even the cheapest program--which another already uses with the greatest satisfaction.

[Answer] You are right. But even today collation is not obligatory, and there are no consequences accompanying superfluous expenditure.

[Question] But this is the only way to get things on track. In any case, how much do the councils spend yearly for such purposes in Budapest?

[Answer] There is no total, comprehensive record of this. The value may vary around approximately one percent of the budget. By way of comparison, developed city administrative units spend 2-3 percent of their budgets for such purposes.

[Question] So I still do not understand. Why was it necessary to create a new organization? Would it not have been possible, for example, to start setting things right by regulating FOINFORM?

[Answer] This is not the first time the question has been raised, and with good reason. The executive committee dealt with this idea, but obviously they rejected it for the time being, out of "diplomatic" considerations. So we were created.

[Question] So in the light of all this, how do you see your future?

[Answer] I am not at all pessimistic. Because while it is true that we are on the same level with the other council organization firms in regard to our domain of authority, it appears in practice that we may gain ascendancy over them. We have worked out a uniform developmental concept, so the various branches increasingly regard us as the depository or patron of capital computerization. They talk to us and come to agreements with us and we get the money from the budget for the several stressed organizational tasks. So a process of closing ranks can begin.

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ADVANCES IN ANTICORROSIVE COATINGS, CASTING TECHNOLOGY

Warsaw RZECZPOSPOLITA in Polish 7-8 Sep 85 p 4

[Article by (al): "Invented in Poland: Will We Do Away With Corrosion?"]

[Text] For many decades research institutes all over the world have been fighting corrosion, so far with little success. It is possible to contain this process, but not eliminate it completely. The losses incurred by the economy due to corrosion, however, have been motivating scientists for continued research and development into new methods for corrosion prevention.

At some point it seemed as though the method of zinc coating used on an industrial scale would be the best solution. Unfortunately, it has its shortcomings. A perfect anticorrosive coating is aluminum. However, this method has so far remained unusable for coating steel wires and cables. Due to poor cohesiveness, the coating falls off at the bends. The use of a bath at a temperature of about 700°C to apply the aluminum coating softens the steel wire. As a result, the strength of the steel cable after the coating process is cut in half.

A major result in research into aluminum coating has been attained by the research group headed by Aleks Moszcynski, DSc, at the Military Technical Academy. The scientists have developed a method combining the application of the aluminum coating with a thermal processing. After the bath, the steel is subjected to a compression treatment. As a result, the adhesion of the protective coating is improved, while the strength of the wire is 2.5 times greater than with the conventional process.

The industry is waiting for the results of the tests. The materials with such properties would be ideal for making reinforcement nets for concrete, ship cables, power transmission lines, reinforcement nets for construction and for uses in food industry and transport.

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Casting has been used on an increasing scale in modern industry. The main reason for this development is the successes in improved productivity and improved quality of castings. An important role is played by the tendency to decrease the unit mass of cast components (thanks to proper shaping and a smaller allowance of material for the finishing treatment). These tech-

nological requirements can be realized on the one hand thanks to the modern machinery used for die casting and on the other thanks to the broader design possibilities of the new molds.

This is illustrated by the new types of castings such as a cylinder for a two-stroke engine and a power saw. The design documentation for these items has been recently prepared by the Experimental Center of the Institute of Casting at Krakow. The design office of the center, since its creation in 1954, has prepared more than 1500 design documents of molds for die casting. Initially, this work was done solely in support of the center's needs, which continued until the time when special design facilities were developed for die casting.

Over the years, the Institute of Casting has developed a series of complicated molds in conjunction with the implementation of a number of products under license, such as typewriters, Fiat 125p motor cars, brake systems for motor vehicles, control elements for pressure hydraulics, etc.

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At the Polymer Institute of Lodz Polytechnic, a piece of equipment has been constructed for testing the thermomechanical properties of polymers. It can also be used to measure the polymer creep or relaxation at a constant temperature.

The equipment provides data on physical and chemical changes of polymers occurring at temperatures of 150-470°K. From the thermometric curves it is possible to read the temperatures of the phase transitions of the first and second kind and the maximum crystallization rate. On the basis of an analysis of the course of these curves, it is possible to evaluate the segment dimension, the particle mass, the content of crystal phase and detect the onset of the effects of degradation or destruction of the spatial framework. Important conclusions concerning the manufacturing properties of the polymers and the effects of plastifiers, stabilizers and other additives can also be made.

The equipment is automated, easy to use and service and ensures repeatability of results. It is constructed according to an original design covered by Polish patent (no. 85904). The Polymer Institute has constructed an information series of equipment for testing the thermomechanical properties of polymers. The series of instruments was created under contract with the Gdansk Polytechnic, the Kopernikus University at Torun and the Military Institute of Chemistry and Radiometry. The instruments have been given positive evaluations by their users.

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